

**MICROFILTRATION SUPPLEMENTAL TECHNOLOGY  
DEMONSTRATION REPORT**

**FINAL REPORT**

**FOR**

**FDEP CONTRACT WM 640**

**CONESTOGA-ROVERS & ASSOCIATES  
MAY, 1998**

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This project and the preparation of this report was funded in part by a Section 319 Nonpoint Source Management Program grant from the U.S. Environmental Protection Agency through a contract with the Stormwater/Nonpoint Management Section of the Florida Department of Environmental Protection. The total cost of the project was \$401,000, of which \$239,000 or 59.6 percent was provided by the U.S. E.P.A.

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## **EXECUTIVE SUMMARY**

### **S.1.0 BACKGROUND AND PROJECT OBJECTIVES**

The State of Florida's *Everglades Forever Act (EFA)* sets into action a plan for restoring a significant portion of the remaining two – million acre Everglades ecosystem through a program of construction projects, research and regulation. The EFA outlines plans to reduce the phosphorus content of stormwaters and canal surface waters by implementing a program of best management practices (BMPs) coupled with the development of a series of stormwater treatment areas (STAs), which are currently deemed the best available technology for achieving established water quality goals.

The EFA also requires detailed assessment of additional treatment and management techniques to supplement or even potentially replace the STAs. Microfiltration (MF) was identified as a candidate supplemental technology based upon the results of preliminary bench scale testing conducted on representative EAA stormwaters during 1993. Due to the promising results of this initial test program, The US EPA , the South Florida Water Management District (SFWMD) and the Sugar Cane Growers Cooperative of Florida provided funding for additional and more extensive testing of Microfiltration technology to be conducted on representative post STA and BMP stormwaters using pilot scale MF test units.

The Microfiltration Demonstration Project, conducted by Conestoga – Rovers and Associates, was the initial supplemental technology to be field tested as part of the EFA defined Superior Technology Demonstration Program.

The original project objectives included the demonstration, on-site and over a one – year period, of the effectiveness of an innovative best management practice consisting of a stormwater detention basin followed by microfiltration treatment for reducing total phosphorus loading in runoff from the Everglades Agricultural Area (EAA). The project was ultimately carried out at the Everglades Nutrient Removal Project site with the overall technical objectives of longer term and larger scale feasibility testing of the MF technology and evaluation of the performance of MF under variable flow rates and influent phosphorous concentrations.

### **S.2.0 OVERVIEW OF MF TECHNOLOGY AND ESTABLISHMENT OF FIELD OPERATIONS**

#### **S.2.1 MF TECHNOLOGY**

The microfiltration process is a membrane solids separation technique capable of removing particles and suspended solids ranging in diameter from 0.04 to 20 microns. MF membranes can typically remove large macromolecular materials, such as humic

acids and clays, and is also effective at filtering out most bacteria and algae. Low molecular weight compounds and common cations and anions (e.g., sodium, chloride, sulfate, etc.) are not removed and pass directly through the membrane.

Two distinct flow configurations are commonly employed for MF systems including the cross – flow with concentrate recycle (CFCR) and the dead – end flow system. All incoming feedwaters are filtered through the dead – end process and periodic backwashing removes solids that have accumulated on the membrane. The majority of the feed waters are filtered through the CFCR system but a portion is removed directly from the process tank to control solids build – up. Backwashing occurs in the CFCR systems as well but usually is of shorter duration and generates smaller amounts of backwash waters as compared to the dead – end system.

During the timeframe in which the MF supplemental project work plan was being developed, the Memtech America Corporation and Zenon Environmental Inc., were among the leaders in North America in the development of full - scale commercial applications of MF treatment technologies. In addition, both of these organizations had fully automated pilot units available for use. Based upon these factors, the Memtech and Zenon MF pilot units were selected for testing on the Demonstration Project.

The Memtech Pilot Unit, the Memcor 6M 10C, uses 0.2 micron pore size organic membranes and is classified as a dead – end MF system. The Memcor unit consists of 6 bundled membranes possessing a total of 968 square feet of membrane filter area. The nominal flow rate through the unit ranges from roughly 35 to 50 gallons per minute (gpm).

The Zenon Pilot unit uses a 0.1 micron pore size organic membrane and is considered a CFCR MF system. A total of 450 square feet of membrane surface area is contained in 3 “cassettes” of bundled fibers that are suspended into a process feedwater tank. The nominal flow rate through the Zenon unit ranges from 8.5 to 10 gpm.

### **S.2.2      ESTABLISHMENT OF PILOT UNIT**

During late September and early October, 1996, The Memcor pilot unit was installed in a 14 by 32 foot field trailer and was transported to the Everglades Nutrient Removal (ENR) Project. With the assistance of SFWMD personnel, establishment of ENR post BMP and post STA field trailer locations were determined. Representative locations were identified in close proximity to the G – 250 (ENR influent/post BMP) and G – 251 (ENR effluent/post STA) pump stations, respectively.

Plumbing and electrical connections were completed during the first week in October and the pilot unit was ready for initial operation on October 8, 1996. Feedwater for the pilot unit was drawn from the center of the ENR canal at a depth of approximately two feet below the surface. An intake structure consisting of a Styrofoam float and a

cable/pulley system was used to suspend the intake hose in the canal center. After passing through a coarse screen that removed any coarse pieces of solids from the feed stream, the surface waters were discharged into a 500-gallon equalization tank. During MF testing, the equalization tank was continuously being recharged with canal water in order to ensure fresh, representative sources of influent feed stream were always available for testing.

Coagulant addition was accomplished by preparing appropriate concentrations of chemical stock solutions in 30 gallon capacity day tanks. Chemical metering pumps were used to feed coagulant into the MF unit feed stream. Ferric chloride, alum and polyaluminum chloride were all used at various times during the testing program to determine their relative effectiveness.

Solids generated by the backwash process were collected in above ground 2500 gallon plastic tanks. The solids were allowed to settle in these tanks and the supernatant overflowed and was returned to the ENR. Solids were retained for longer periods of time to assess their settling properties and until they could be chemically characterized. Disposal of solids occurred only after a full TCLP analysis was conducted to ensure they contained no defined hazardous substances.

The pilot unit was operated for more than 11 months from October of 1996 through the first part of September, 1997. The Memcor and Zenon MF units were operated side by side from March (when the Zenon unit was installed in the pilot trailer) through September, 1997. During the 11 month testing period, the trailer unit was alternately located at the ENR influent and effluent locations in order to assess the effectiveness of MF treatment on post BMP and post STA waters. Dry and wet season testing at the ENR influent station was also conducted.

Testing protocols included varying MF feed flow rates, assessing different concentrations of select chemical coagulants, and altering process control parameters such as backwash rate, solids bleed rates and rates of aeration. The primary operations objective for the pilot study was to determine the lowest chemical coagulant dose coupled with the optimal combination of MF operating conditions (i.e., GFD, backwash frequency, etc.) yielding total phosphorus concentrations of 0.01 mg/l (as P) or less.

### **S.3.0 MF STUDY RESULTS**

A total of 2965 hours of operation was logged for the Memcor unit and 2084 hours for the Zenon facility during the entire field-testing program. After the initial start – up phase, both pilot units were operated continuously, 24 hours per day, for extended time periods. Both pilot units were operated during periods of active ENR pumping and also during stagnant, no pumping conditions. Full-scale treatment system would operate not only during heavy rainfall and surface water pumping events but also would treat surface waters stored for long periods in retention or equalization basins. Obtaining

data and operating the pilot unit during stagnant canal conditions provided a somewhat different profile of feedwater characteristics than is normally presented by the SFWMD ENR summary data. The SFWMD collects and reports ENR results on samples obtained only during influent or effluent pumping events for their ENR 002 and 012 stations, respectively.

More than 7200 analytical data points were obtained during the pilot unit investigations. Of these data, less than 0.3 % were determined to be data outliers and were not used in developing conclusions or assessing the MF technology. Statistical assessments of the data included calculations of arithmetic means, standard deviations and analysis of variance comparing respective influent and effluent data sets.

### **S.3.1 PHOSPHORUS REMOVAL RESULTS**

#### **S.3.1.1 POST BMP RESULTS**

On post BMP feedwaters containing greater than 50 ppb of total phosphorus as P, microfiltration, without chemical addition, removed between 60 to 80 % of the total P. Average total phosphorus feed versus Memcor and Zenon filtrate results are provided below:

<b><i>Feed Total P (mg/l as P)</i></b>	<b><i>Zenon Filtrate (mg/l as P)</i></b>	<b><i>Memcor Filtrate (mg/l as P)</i></b>
0.081	0.017	0.033

MF treatment coupled with coagulants produced the following average results on post BMP feedwaters:

<b><i>Coagulant Type/ Dose</i></b>	<b><i>Zenon Filtrate P (mg/l as P) % Removal</i></b>		<b><i>Memcor Filtrate P (mg/l as P) % Removal</i></b>	
Ferric Chloride (8 to 9 mg/l as Fe)	0.007	83%	0.005	88%
Alum (9 mg/l as Al)	0.011	80%	0.008	79%
Polyaluminum Chloride (8 mg/l as Al)	0.012	86%	0.010	88%

**S.3.1.2 POST STA RESULTS**

During post STA investigations when no coagulant was being fed, microfiltration alone removed on average roughly 45 to 55 % of the feed total phosphorus concentration. The Zenon unit produced an average filtrate concentration of 0.013 mg/l as P and the Memcor produced an average concentration of 0.011 mg/l using MF alone with no chemical addition. Average total P in the feedwaters during these trials was 0.024 mg/l as P.

MF treatment coupled with coagulants produced the following average results on post STA feedwaters:

<b>Coagulant Type/Dose</b>	<b>Zenon Filtrate P (mg/l as P) % P</b>		<b>Memcor Filtrate P (mg/l as P) % P</b>	
Ferric Chloride (2-4 mg/l as Fe)	0.008	60%	0.010	50%
Alum (2-4 mg/l as Al)	0.011	48%	0.010	58%

Phosphorus removals were plotted against select ferric chloride and alum coagulant dosages and a linear regression analysis of the data produced relatively high (greater than 0.8) correlation coefficients. As a general guide, a dose of 3 mg/l of Fe or Al removes approximately 0.029 mg/l of phosphorus and a dose of 7 mg/l removes approximately 0.055 to 0.060 mg/l of phosphorus.

**S.3.2 ADDITIONAL ANALYTICAL RESULTS**

Periodic analyses were conducted on feedwater and Memcor/Zenon filtrates for numerous additional analytical parameters. Analyses of variance were performed on the feed compared to filtrate data to determine if there were statistically significant differences at the 95 % confidence interval. The results of these analyses indicated no significant differences between feed and filtrate results for the following analytes:

**POST BMP WATERS**

MEMCOR

Color  
Alkalinity  
Total Dissolved Solids  
Kjeldahl Nitrogen  
Ammonia

ZENON

Color  
Alkalinity  
Total Dissolved Solids  
Kjeldahl Nitrogen  
Ammonia

Nitrate  
Nitrite  
Sodium  
Zinc  
Calcium  
Copper  
Magnesium  
Mercury  
Molybdenum  
Potassium  
Ametryn  
Atrazine  
2,4 – D  
Total Solids  
Reactive Silica

Nitrate/Nitrite  
Total Organic Carbon  
Sodium  
Zinc  
Calcium and Magnesium  
Copper  
Manganese  
Mercury  
Molybdenum  
Potassium  
Ametryn  
Atrazine  
2,4 – D  
Total Suspended Solids  
Total Solids  
Reactive Silica

### **POST STA WATERS**

#### **Memcor**

Total Solids  
Suspended Solids  
Total Organic Carbon  
Color  
Alkalinity  
Total Dissolved Solids  
Reactive Silica  
Sodium  
Zinc  
Calcium  
Magnesium  
Mercury  
Molybdenum  
Potassium  
Ametryn  
Atrazine

#### **Zenon**

Total Solids  
Suspended Solids  
Total Organic Carbon  
Color  
Alkalinity  
Total Dissolved Solids  
Reactive Silica  
Sodium  
Zinc  
Calcium  
Magnesium  
Mercury  
Molybdenum  
Potassium  
Ametryn  
Atrazine

Low level Mercury analyses were collected by SFWMD personnel during the field studies on feed water and Memcor and Zenon filtrate samples. The average results of these total mercury analyses in the feed waters was equal to 1.37 nanograms per liter and 0.98 and 1.29 nanograms per liter in the Memcor and Zenon filtrates, respectively.

Bioassay and algal growth potential (AGP) testing were also performed on the Memcor unit MF feed and filtrate samples periodically during the period of March 24, 1997

through August 18, 1997. The total phosphorus concentrations were too low to determine any meaningful AGP trends or relationships and 11 out of 12 bioassay test results showed no sustained observed effect when comparing the Memcor filtrate results to the corresponding influent samples.

During periods of Ferric Chloride coagulant addition, the average feed and permeate concentrations for Iron and Chloride were as follows:

	<b><u>Feed<sup>1</sup></u></b> <b><u>Concentrations</u></b> <b><u>(mg/l)</u></b>		<b><u>Average Permeate</u></b> <b><u>Concentrations</u></b> <b><u>(mg/l)</u></b>			
	<b><u>Iron</u></b>	<b><u>Chloride</u></b>	<b><u>Iron</u></b>		<b><u>Chloride</u></b>	
			Memcor	Zenon	Memcor	Zenon
ENR Influent Station	0.093	157	0.260	0.83	177	204
ENR Effluent Station	0.025	170	0.038	0.070	167	175

During periods of Alum (Aluminum Sulfate) addition, the average feed and permeate concentration for Aluminum and Sulfate follows:

	<b><u>Feed<sup>1</sup></u></b> <b><u>Concentrations</u></b> <b><u>(mg/l)</u></b>		<b><u>Average Permeate</u></b> <b><u>Concentrations</u></b> <b><u>(mg/l)</u></b>			
	<b><u>Aluminum</u></b>	<b><u>Sulfate</u></b>	<b><u>Aluminum</u></b>		<b><u>Sulfate</u></b>	
			Memcor	Zenon	Memcor	Zenon
ENR Influent Station	0.10	87	0.31	0.86	117	134
ENR Effluent Station	0.10	50	0.36	0.97	62	64

The above results show that MF coupled with Ferric Chloride can marginally increase treated permeate iron and chloride levels, whereas MF coupled with alum addition can marginally increase permeate aluminum and sulfate levels.

#### **S.4.0 VENDOR PROCESS RECOMMENDATIONS**

Complete summaries of all operating data collected during the MF field investigations were submitted to Memcor and Zenon for review and analysis. Both organizations have developed proprietary computer programs to evaluate process control data such as flow rates, backwash frequencies, coagulant chemical doses, etc, in order to develop optimal

<sup>1</sup> Represents native concentration at sampling point upstream of coagulant addition.

combinations of process variables to be used in developing full scale designs. Resulting design recommendations for full-scale applications obtained from the MF vendors are summarized below:

<b><i>Parameter</i></b>	<b><i>Memcor</i></b>	<b><i>Zenon</i></b>
Flux Rate, GFD:	40	40
Chemical Cleaning Solution	Citric Acid	Citric Acid
Backwash Frequency	0.33 hours	0.125 hour
Frequency of Chemical Cleaning	14 days	14 days

### **S.5.0 FULL-SCALE MICROFILTRATION APPLICATION**

Using the average plus two standard deviations of the STA 2 design flow and phosphorus data for the 10 - year baseline period of record, conceptual designs were developed for full-scale Microfiltration systems for both post STA and post BMP scenarios.

The post BMP facility was designed to treat an average flow of 200 million gallons per day and using an average ferric chloride dose 8 mg/l as Fe, the filtrate phosphorus concentration from the system would be equal to 0.01 mg/l as P. A 3,500-acre flow equalization basin was included in the design to accommodate the wide fluctuations in feed water flow.

The full-scale post STA MF treatment facility was designed to handle an average daily flow of 175 million gallons per day and an average dose of ferric chloride of 3mg/l as Fe would be needed to routinely produce an effluent containing 0.01 mg/l as P. It was assumed that flow equalization would be accomplished in the STA itself by increasing the designed water depth of the STA by a maximum of 2 feet (providing an additional 12,860 acre feet of water storage in the STA). The average increase in STA 2 water elevation would be 7.2 inches.

Both the post STA and BMP designs assume that approximately 10 % of the influent phosphorus mass would not be treated to a concentration of 0.01 mg/l as P during extreme peaks in flow. During these time periods, the Post BMP average blended and treated discharge concentration was calculated to be 0.055 mg/l as P. The Post STA average blended and treated discharge concentration would be 0.028 mg/l as P during the peak flow periods. The remaining 90 % of the phosphorus mass into the MF treatment system would be treated to yield a blended effluent concentration of equal to or less than 0.01 mg/l as P.

### **S.6.0 FULL SCALE MF TREATMENT SYSTEM COST ESTIMATES**

The 50 year present worth calculations were performed on the estimated capital and operating and maintenance costs for both the full scale post BMP and STA Memcor and Zenon conceptual designs. Estimates of the 50 – year present worth for costs full scale MF treatment systems are summarized below

	<b><u>POST BMP (200 MGD)</u></b>		<b><u>POST STA (175 MGD)</u></b>	
	<b><i>MEMCOR</i></b>	<b><i>ZENON</i></b>	<b><i>MEMCOR</i></b>	<b><i>ZENON</i></b>
50 – YEAR PRESENT WORTH (PW) (\$ in Millions):	553.2	497.5	307.8	258.7
50 - YEAR PW (\$/Million Gallons Treated):	196.9	177	136.8	115

### **S.7.0 CONCLUSIONS**

Based on the results of this one-year demonstration project, the following conclusions have been made:

1. Chemical treatment (Al or Fe) followed by MF is capable of removing total phosphorus down to 0.01 mg/l (as P) for both post BMP and STA waters. Chemical dosages required for post BMP and STA waters range from 8 to 10 and 3 to 4 mg/l as Fe or Al, respectively.
2. There were no appreciable observed differences in the ability of the two pilot units tested (Memcor and Zenon) to remove phosphorus from the surface waters.
3. The estimated 50-year present costs for full-scale Zenon based MF system were nominally lower than an equivalent Memcor based system. However, considering the order of magnitude nature of the cost estimates, these differences are not considered to be substantial.
4. Bioassay and algal growth potential studies conducted on Memcor MF feed and filter samples demonstrated no sustained adverse impact on receiving surface waters.
5. Even though ferric chloride and alum phosphorus removal rates were approximately the same, ferric salts would be preferred for use in full scale

applications due to their apparent ability to extend MF run times and also because of recent environmental perceptions related to the use of aluminum.

6. Since the post BMP MF scenario requires an up-front equalization basin approximating the size of an STA, it is unlikely that full-scale application of MF to treating BMP water to effluent total phosphorus level of 10 µg/L would be cost effective.
7. Membrane technology (microfiltration or ultrafiltration) has excellent potential to be an integral part of a coupled STA-low chemical dosing – membrane system particularly when considering higher Phase 2 (i.e., 20 – 30 ppb) effluent total P targets and potential water supply considerations.

### **S.8.0 RECOMMENDATIONS**

1. Membrane filtration is an emerging technology and equipment capital costs continue to decline as more membrane facilities are being built. For example, Memtech Corporation has indicated that the quantity total membranes produced by them has doubled during each of the last 2 years. As additional supplemental technologies (i.e., SAV-limerock, PASTA, etc.) studies are completed, MF capital costs should be revisited and recalculated to ensure up to date cost comparisons are being made.
2. Any full scale treatment facilities (such as MF or direct filtration) should incorporate the ability to conduct real time, on-site phosphorus analysis. Such real time analyses will result in increased treatment efficiencies and lower chemical costs.
3. Recent advances in ultrafiltration technology have ostensibly made it a stronger competitor to microfiltration. Preliminary promising information suggests that under conditions somewhat similar to the EAA, ultrafiltration applications could reduce phosphorus concentrations to less than 0.01 mg/l as P without the use of chemical coagulants and at feed water pressures only slightly higher than MF. Small scale investigations should be carried out using ultrafiltration, without chemical addition, on post STA water to determine the technology's effectiveness.
4. If the small scale ultrafiltration tests show promise, a demonstration project should be established at the ENR test cells for an extended time period to evaluate the overall efficacy of the technology particularly in a coupled STA - low intensity – chemical dosing – membrane system mode.

## **1.0 INTRODUCTION**

### **1.1 BACKGROUND**

The State of Florida's *Everglades Forever Act (EFA) of 1994 (Chapter 373.4592, Florida Statutes)* sets into action a plan for restoring a significant portion of the remaining 2 million-acre Everglades ecosystem through a program of construction projects, research and regulation. The general goal of this restoration program is implementation of comprehensive and innovative solutions related to the issues of water quality, water quantity and invasion of exotic flora and fauna species.

The EFA outlines a plan to begin restoring the Everglades ecosystem by reducing the phosphorus in stormwater which enters the ecosystem, improving the quantity and distribution of freshwater and setting the deadlines to achieve these objectives. The EFA also states that a combination of stormwater treatment areas (STAs) and Best Management Practices (BMPs) are currently the best available technology for achieving the established interim water quality goals.

Even though the EFA establishes STAs and BMPs as the best available technologies, it also requires the identification of treatment and management methods that are conceivably superior to STAs in achieving optimum water quality and quantity for the benefit of the Everglades. These superior technologies must be sufficiently demonstrated to establish their technical, economic and environmental feasibility for basin scale application either as a replacement for or an addition to the STAs.

The Microfiltration Demonstration Project conducted by Conestoga-Rovers & Associates (CRA) was the initial supplemental technology to be field tested as part of the EFA defined Superior Technology Demonstration Program. Primary funding for the project was provided by the EPA - 319 H Grant Program and the South Florida Water Management District. Additional project funds were provided by the Sugar Cane Growers Cooperative of Florida and CRA. The Florida Department of Environmental Protection served as the contracting agency for the Microfiltration Study and CRA received notice to proceed under FDEP Contract Number WM 640 on July 26, 1996.

This final report summarizes the results of the year-long study and field investigations which commenced in September of 1996 and were completed at the end of August 1997.

## **1.2 PROJECT OBJECTIVES**

As stated in the workplan included in Attachment A of the WM 640 Contract, the original study objectives include the demonstration, on site, and over a 1-year period, of the effectiveness of an innovative Best Management Practice consisting of a stormwater detention basin followed by microfiltration treatment for reducing the total phosphorus loading in runoff from the Everglades Agricultural Area (EAA). The longer term and large-scale pilot testing/feasibility study of the MF technology at the Everglades Nutrient Removal Project will be assessed and the evaluation of the performance of the MF pilot unit under variable flow rates and influent phosphorus concentrations will be conducted.

As part of the demonstration of the effectiveness of MF, a comparison will be made between data collected from the study for the parameters and locations noted in the sampling schedule as a means of determining potential removal or addition of parameters from the system by MF with chemical addition. Additionally, a comparison of a surface water influent to, and effluent from, the MF Unit will be made based on the results of toxicity bioassays and AGP analyses.

## **1.3 OVERVIEW OF MICROFILTRATION TECHNOLOGY**

### **Filtration Mechanism**

The microfiltration process is a membrane solids separation technique that can be used to remove particles and suspended solids from a variety of source waters. The technology is called "micro" filtration because the pore size of the membranes can range from 0.04 to 20 microns. Figure 1.1 shows the relative pore size of the microfiltration membrane process compared to those for reverse osmosis, nano and ultrafiltration, and conventional (i.e., sand) filters commonly used in water treatment facilities. Microfiltration membranes can remove large macromolecular materials such as humic acids and clays from a liquid stream and are also effective at filtering out most bacteria and algae. Low molecular weight compounds and common inorganic constituents are typically not removed and pass directly through the membrane. Microfiltration has a technical advantage over conventional water treatment filtration processes via the ability to remove particle sizes up to an order of magnitude smaller in diameter. Commercially available microfiltration membranes are made from a variety of materials including organic polymers, such as polypropylene, ceramics and metal alloys. Microfiltration systems are operated at much lower feed pressures than reverse osmosis or

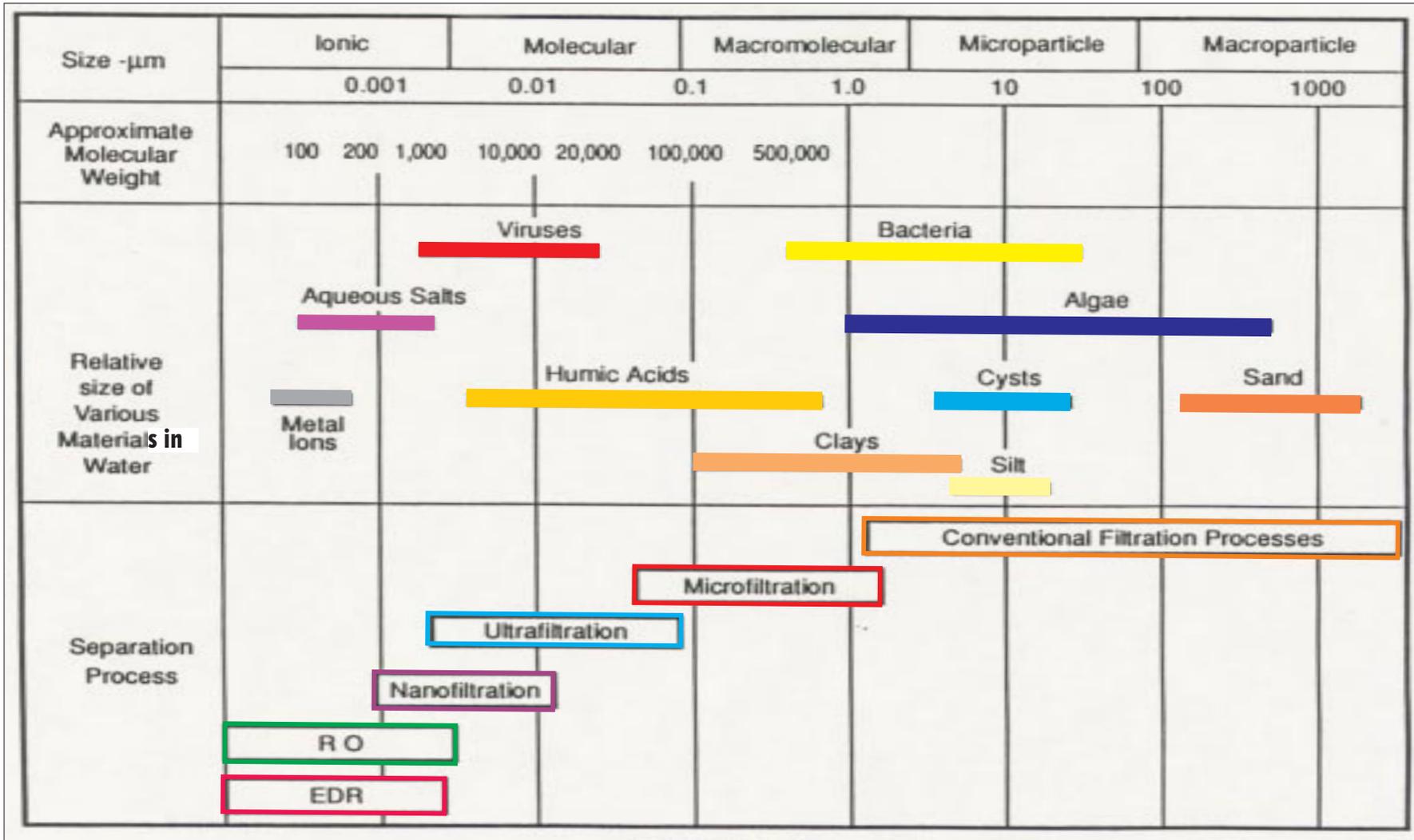


figure 1.1

MEMBRANE FILTRATION OVERVIEW (MEMCOR)

ultrafiltration due to the greater effective pore size. Typical feed pressures for MF systems are in the range of 25 to 35 pounds per square inch (PSI) which are roughly an order of magnitude lower than those required for reverse osmosis processes.

### **Microfiltration Productivity**

The productivity of microfiltration membranes is usually measured by the amount of flow that can pass through a unit area of membrane surface and is commonly referred to as the "flux rate". Flux rates are typically measured in units of gallons of flow per square foot of membrane per day (gfd). Typical gfd values for organic polymer membranes range from 25 to 50, or more, depending upon the amount of solids and chemical composition of the feed streams.

### **Typical Flow Configurations**

Two distinct flow configurations are commonly employed for microfiltration systems:

- Cross-flow with concentrate recycle (CFCR); and
- Dead-end flow system.

In the CFCR configuration the majority of the feedwater stream passes through the membrane and is collected as permeate with the remainder of the feed stream being discharged directly from the system carrying with it solids constituents that have been trapped by the membranes. The CFCR configuration is also commonly referred to as a "feed and bleed" process.

The dead-end process filters all of the incoming feedwaters. Accumulated solids are trapped on the surface of the membrane until backwashing is performed. During backwashing, accumulated solids are flushed away from the membranes and are collected for disposal. Backwash volumes typically represent roughly 2 to 5 percent of the total influent feed stream.

### **Productivity (Flux) Maintenance and Restoration**

As solids are accumulated on the surface of the membranes during the normal filtration process, the feed pressure slowly increases. The rate of this increase is, in part, dependent upon the nature and extent of solids contained in the influent stream. Routine flux restoration (i.e., routine measures taken to reduce the feed pressure) is

accomplished by backwashing the solids off of the membranes. Solids that are not readily removed during routine backwashing accumulate to the point that a periodic chemical cleaning of the membranes may be required. Whereas routine backwashing events occur several times each hour of membrane filtering, chemical cleaning usually is required every 2 to 4 weeks of continuous membrane operation. The chemical cleaning process washes off impacted solids and also removes biological solids and films that may have attached to the membrane surfaces as well. A variety of chemical cleaning solutions (i.e., high pH surfactants, low pH acids, chlorine) are available for use. Selection of the optimal cleaning solution must be empirically determined for each specific feed stream and is based upon its relative effectiveness at restoring membrane flux capacity.

#### **1.4 WORKPLAN ELEMENTS COMPLETED DURING THE PROJECT**

The workplan for the Microfiltration Pilot Study identified a total of 18 tasks to be completed during the 13-month planned study period. The plan called for the assessment of the microfiltration technology to remove phosphorus from influent and effluent flows to the Everglades Nutrient Removal (ENR) test facility operated by the South Florida Water Management District (SFWMD). The ENR is an approximate 3,000-acre prototype constructed wetlands (also commonly referred to as a filter marsh or a stormwater treatment area) located Northwest of Water Conservation Area 2 (WCA 2). The WCA 2 is also referred to as the Arthur R. Marshall Loxahatchee National Wildlife Refuge. A location map for the ENR is provided on Figure 1.2.

A total of 6 months of actual pilot unit operation was called for in the work plan with 3 months of testing proposed at the ENR surface water inflow and outflow stations, respectively. Additional elements in the work plan established dates for periodic progress meetings with the FDEP and the SFWMD, completion of a background literature review on microfiltration technology, submittal of written progress reports and the completion of a video production documenting pilot unit operations. Table 1.1 summarizes the 18 elements of the work plan and provides an overview of project activities completed for each identified task.

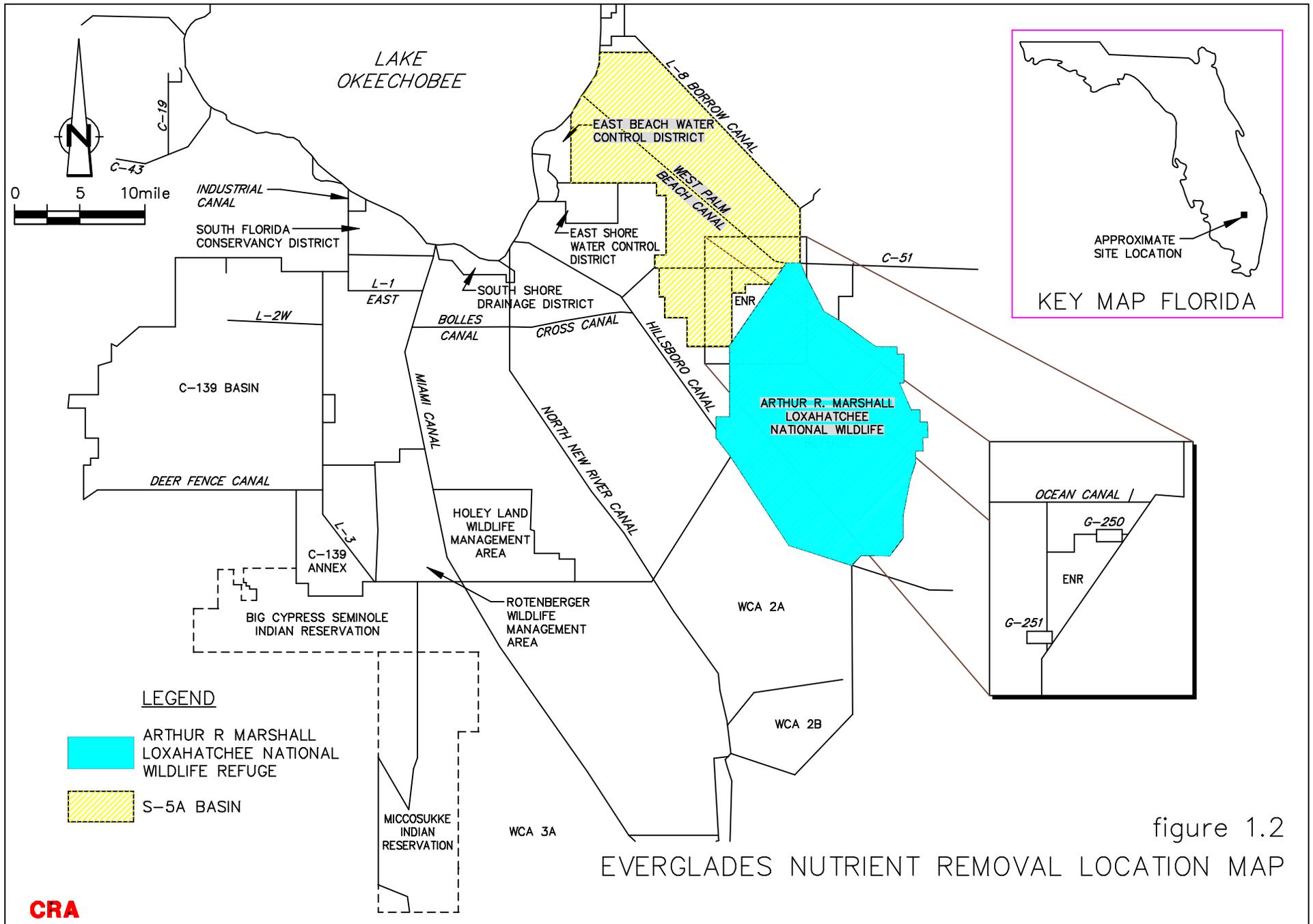


figure 1.2  
 EVERGLADES NUTRIENT REMOVAL LOCATION MAP

**TABLE 1.1**

**MICROFILTRATION PILOT STUDY WORK PLAN ELEMENTS  
COMPARED TO ACTIVITIES COMPLETED**

Work Plan Element		Outcome
Tasks 1 and 2	Prepare Work Plan and Obtain Signed Contract	Work plan submitted and signed contract received on July 26, 1996
Task 3	Submit Preliminary Literature Review	Preliminary literature review submitted on October 17, 1996
Task 4	Conduct Project Orientation Meeting	Meeting held with FDEP and SFWMD representatives on October 23, 1996
Task 5	Prepare Quality Assurance Plan	Quality Assurance Plan submitted on September 25, 1996. Pending approval received on January 6, 1997; final approval received on May 19, 1997
Task 6	Final Literature Review Submittal	Review comments received on January 24, 1997; comments incorporated and final submitted on March 5, 1997
Task 7	Equipment Acquisition	Memcor Pilot Unit received in South Florida in August – installed at ENR on September 28, 1996, 2 weeks after receiving approval to locate the facility at ENR. Zenon Unit received in South Florida in late February
Task 8	Equipment Set-up	Memcor unit electrical and plumbing installation completed on October 8, 1996. Zenon Unit electrical and plumbing installation completed on March 12, 1997
Task 9	Start – up and Training	Training on Memcor conducted during October 9 through November 1, 1997. Training on Zenon conducted from March 12 through March 28, 1997
Task 10	Pilot Unit Operation	Aside from periods of down time related to equipment repair and moving pilot units between G-250 and G-251 stations, Memcor unit was operated from October 9, 1996 through August, 1997; Zenon unit was operated from March 12, 1997 through August, 1997

**TABLE 1.1**

**MICROFILTRATION PILOT STUDY WORK PLAN ELEMENTS  
COMPARED TO ACTIVITIES COMPLETED**

Work Plan Element		Outcome
Task 11	Conduct 2 Field Days	First field day conducted with ETAC members on November 21, 1997. Second field day completed with SFWMD representatives, including the Everglades Regulations staff on February 10, 1997.
Task 12	Video Production	Video filming of pilot unit operations, including sampling protocols, completed. Video tape editing in process
Task 13	Monthly Data Submission	Hard copy project updates submitted on monthly basis. Entire analytical data base has been submitted electronically
Task 14	Quarterly Progress Reports	Quarterly progress reports submitted on March 3, 1997, May 1, 1997 and July 21, 1997 covering first, second and third quarter activities, respectively
Task 15	Quarterly FDEP Meetings	Met with FDEP on March 7, 1997, May 13, 1997 (FDEP and SFWMD), and September 10, 1997 (FDEP and SFWMD)
Task 16	Annual EPA Report	Subject report to serve as required deliverable
Task 17	Draft Final Report	Submitted February, 1998
Task 18	Final Report	Subject Report – Submitted May, 1998

## 2.0 MICROFILTRATION TECHNOLOGY LITERATURE REVIEW

### 2.1 DATA SOURCES

CRA's literature search included an extensive on-line computer literature search (including the use of current Internet search engines) and accessing other references and data sources listed in various catalogues, databases, indexes, equipment suppliers' literature, and/or available through Universities of Waterloo , Toronto, and Guelph. In total, in excess of an estimated 3 million references were accessed. The main keywords used for the literature search were "microfiltration", "phosphorus", "treatment", "water", "wastewater", and "stormwater". A listing of the data sources accessed in this search is given below:

<i>Abstracts</i>	<i>Period</i>
Water Resources Abstracts	1967-1996 (April)
Environmental Abstracts	1980-1996
Pollution Abstracts	1970-1996
Compendex/Engineering Index Abstracts	1987-1996 (April)
Applied Science and Technology	1994-1996
Chemical Abstracts	1967-1996

#### Catalogues

Wat Cat  
UT Link  
UT Resource Multi-media Search

#### Databases

US EPA  
US Federally Funded Research  
South Florida Water Management District

<b><i>Indexes</i></b>	<b><i>Period</i></b>
Purdue University Conferences	1976-1992
American Water Works Assoc. Journal	1991-1996
Journal of Water Pollution Control Federation	1986-1988
Water Pollution Research Journal (Canada)	1993-1995
Effluent and Water Treatment Journal	1984-1985
Applied Science and Technology	1983-1996

### Suppliers

Memcor (A Division of Memtec American Corp.)  
Zenon Environmental Inc.

### Internet Engines

Alta Vista  
Yahoo  
Open Text  
Lycos  
Webcrawler  
Emily (Electronic Membrane Information Library)

It was determined that there is very little published literature relating to phosphorus removal using microfiltration, and in general, most of the useful information was found from non-Internet sources, as most websearches revealed that many of the websites introduce sources of information in the generic form, and that the quality of the information is questionable.

## **2.2 LITERATURE SEARCH FINDINGS**

Using the above data sources, CRA located information (study reports) on treatment technologies utilizing membranes in general, and microfiltration in particular, for the removal of total phosphorus (TP). The accessed information can be grouped into three major categories:

- (1) TP removal from stormwater runoff and drinking water;
- (2) TP removal from wastewater; and

- (3) TP removal from lake water.

Membrane technologies and MF processes are described in general terms below. A brief description of the identified studies reported in the literature dealing with TP removal and a summary of the findings for each study are also presented below.

### **2.2.1 MEMBRANE TECHNOLOGIES**

The following general information related to membrane technologies was taken from a reference authored by Raycheba (1990).

- Like conventional filtering systems, membrane technologies operate at room temperature. Phase changes (such as vaporizing water during a distillation) are not needed to effect the separation. Consequently, membrane technologies are:
  - very energy efficient compared with competing processes, such as distillation, and
  - can be used to effect separations of temperature sensitive products, such as pharmaceuticals, biological products, and foods.
- Membrane processes are generally distinguished by:
  - the physical property that forms the basis for selection or rejection of substances (particle size, charge, or adsorption properties), and
  - the driving forces that are used to provide adequate flow of the substances across the membranes (pressure or electrical potential difference).
- Some of the applications for which membrane technologies can provide energy efficient solutions are:
  - separation of oil from waste oil-water mixtures;
  - desalination of brackish water,
  - concentration (or dewatering) of fruit juices,
  - purification of water for use in the electronics industry, and
  - reduction of biological oxygen demand (BOD) and chemical oxygen demand (COD) of process waste streams.

## **2.2.2 MEMBRANE TECHNOLOGY ADVANTAGES**

The following are some of the main advantages of the membrane technology (Raycheba, 1990).

1. Energy savings:
  - energy consumption is low since no phase change is required for processing.
2. Raw-material recovery:
  - valuable products can be recovered for re-use or sale, and
  - both the concentrate and the permeate streams may be usable.
3. Membrane processes operate at ambient temperatures and are suitable for processing of heat sensitive products.
4. Reduction of transportation costs:
  - removing water from process streams can significantly reduce the volume of product (concentrate) to be transported.
5. Low floor space requirements for systems.
6. Expansion:
  - the modular character of membrane system designs makes it simple to plan a system to meet present needs, while providing for future expansion.
7. Automation:
  - many systems can be instrumented to automatically start, stop, or begin a cleaning cycle, and
  - system controls can be installed to shut down automatically in the case of pH, pressure, or temperature problems.
8. Low labor intensity and costs:
  - many systems require little maintenance, and
  - little operator training is required because most of the equipment, such as pumps, valves, flow meters, pressure, and temperature gauges, are common for the industry.
9. Environmental regulation:
  - membrane technologies can provide waste treatment that meet or exceed regulatory requirements.

10. Technology advantage:
  - each membrane process has specific capabilities that permit certain applications which would not be possible otherwise, and
  - excellent product quality.
11. Custom systems:
  - most systems are engineered for each particular application.
12. Short start-up time:
  - many microfiltration, ultrafiltration, and reverse osmosis systems can be re-started in less than a half hour.
13. Clean-in-place (CIP):
  - because of the modularity of membrane systems, it may not be necessary to shut down the entire system for cleaning.

### **2.2.3 MEMBRANE TECHNOLOGY DISADVANTAGES**

The following are some of the main disadvantages of the membrane technology (Raycheba, 1990).

1. Fouling:
  - all membrane systems experience fouling;
  - pre-filtration and other fouling reduction methods are usually necessary, and
  - periodic cleaning is needed to restore flux.
2. Limitations imposed by membrane materials:
  - chemical compatibility of feed stream and membrane materials, and
  - high cost of certain newly developed high performance membranes (ceramic and metallic).
3. Chemical compatibility:
  - process streams must be chemically compatible with membrane and system construction materials.

### **2.2.4 MICROFILTRATION (MF)**

The following are main characteristics particular to the MF system (Raycheba, 1990).

- MF discriminates between particles on the basis of size;
- MF uses "loose" membranes, that is, membranes that have relatively large pores;
- pore sizes of MF membranes range from 0.05  $\mu\text{m}$  to 20  $\mu\text{m}$  (500 to 200,000  $\text{\AA}$ ); membranes with a pore size of 0.45  $\mu\text{m}$  are most commonly used;
- MF uses relatively low applied pressures from 20 to 350 kPa (3 to 50 psi);
- MF is used to separate or remove relatively large particles, such as microbes, bacteria, paint pigments, and macromolecules with molecular weights greater than about 300,000; and
- MF uses a conventional flow path. The input flow is perpendicular to the membrane surface, and all of the solvent to be processed passes through the membrane.

### **2.2.5 TP REMOVAL FROM STORMWATER RUNOFF AND DRINKING WATER**

The information derived for this treatment category was obtained from three main sources: Conestoga-Rovers & Associates (CRA), Zenon Environment Inc., and a report prepared by Brown and Caldwell.

In a paper by Shannon et al. (1995), presented at the Water Environment Federation (WEF) Conference, results of a MF pilot study performed at the Everglades Agricultural Area (EAA) are reported. A 2 gpm MF pilot unit, using a 0.2  $\mu$  polypropylene membrane, was tested at two EAA sites. The results from the pilot work indicated that MF was capable of producing effluent TP concentrations as low as 0.02 mg/L at relatively low coagulant dosages. In addition, some reductions in color, silica, and molybdenum were observed. The effluent appeared to be more marsh-ready than the direct filtration alternative. MF was reported to be cost-competitive with direct filtration and stormwater treatment areas.

In June 1996 CRA toured a Zenon ZeeWeed installation used for treatment of drinking water at Rothesay, New Brunswick. The Town of Rothesay has had problems with high concentrations of iron (5 mg/L) and manganese (0.6 mg/L) in its drinking water supply. Rothesay draws its water from seven wells between 50 and 90 feet deep located in the Carpenter Pond area. The wells service roughly 1,350 households. Depending on the demand, the water usage rate ranges between 240,000 and 480,000 gpd.

The ZeeWeed system was commissioned in April 1996. The system combines oxidation (of iron and manganese) with microfiltration using 0.1  $\mu$  hollow fibre membranes arranged in specially constructed modules and operated under low pressure vacuum. To minimize fouling, the ZeeWeed system utilizes an aeration system to provide mixing and to maintain high flux for scouring the membrane fibres (CRA, 1996). The present capacity of the treatment system is 0.73 mgd (504 gpm). The system will be capable of handling future volumes of up to 1.1 mgd (720 gpm). The existing system achieves non-detectable levels of suspended solids, Giardia, and Cryptosporidium, and iron and manganese levels of below 0.01 mg/L with minimal sludge production (CRA, 1996). No phosphorus data were made available.

In another study, PEER Consultants/Brown and Caldwell, in a report prepared in August 1996 for South Florida Water Management District (SFWMD), presented a desktop evaluation of alternative TP removal technologies. Chemical treatment followed by MF was considered and the technology was rated well in terms of TP removal capability (down to 0.01 mg/L). However, the technology was screened out on the basis of its anticipated high capital and O&M costs.

## **2.2.6 TP REMOVAL FROM WASTEWATER**

A number of sources containing information on the application of MF technology for wastewater treatment were identified. A brief summary of the findings of the identified studies is given below.

Kohl and Lozier (Kohl/Memcor, 1996) used MF technology for pretreating feed waters to a reverse osmosis (RO) system from the Reedy Creek Improvement District (RCID) wastewater treatment plant (WWTP).

In this study, Reedy Creek Energy Services (RCES) evaluated membrane processes to treat advanced wastewater treatment effluent from the Reedy Creek Improvement District (RCID) Wastewater Treatment Plant (WWTP). The overall treatment objective was to demonstrate that the proposed treatment processes can produce finished water that meets Florida Department of Environmental Regulation (FDER)'s discharge requirements for the shallow groundwater table and eventual discharge to Reedy Creek, or for other non-potable uses. The treated water has to satisfy FDER nutrient reduction requirements for surface discharge of 0.04 mg/L total phosphorus (as P) and 1.46 mg/L total nitrogen (as N) on an average annual basis. To meet these levels, reverse osmosis (RO) treatment was required.

To select the most appropriate pretreatment process for RO, in the initial phase, lime clarification was compared to two types of membrane processes: microfiltration (MF) and ultrafiltration (UF). Lime clarification is the conventional pretreatment for RO on secondary effluent, but the procedure involves use of high quantities of chemicals and generates large quantities of solid residuals. MF and UF are relatively unproven for this application, but they require less space, generate little, if any, solids, and can produce a higher-quality RO feedwater.

Bench-scale testing was performed with two MF technologies and one UF technology and with jar testing of lime on actual RCID WWTP effluent. According to the results (Kohl, et al., 1992), MF offered the best combination of costs (capital and operating) and treated water quality. Consequently, two MF technologies, Memcor (manufactured by Memtec America Corp.) and Membralox (manufactured by U.S. Filter), were evaluated during the pilot phase for their suitability to provide RO pretreatment for RCID WWTP effluent.

Pilot testing demonstrated that the proposed process - Memcor MF preceded by alum addition can successfully provide finished product that meets TP discharge standard for surface discharge to Reedy Creek of 0.04 mg/L. Furthermore, use of MF to treat effluent from the RCID WWTP provides a high quality RO feedwater and enables RO membranes to operate cost effectively. The results indicate that MF appears to be an effective alternative to the lime clarification traditionally used for RO pretreatment of secondary effluents.

In this study, it was also shown that the Memcor MF process provides a high-quality RO feedwater at relatively long operating cycles (between 3 and 5 weeks). It was also demonstrated that MF membrane fouling can be effectively removed with simple chemical cleaning.

In an information package published in December 1995, Zenon reported TP removal of up to 90 percent (from 0.1 mg/L to 0.01 mg/L) using the ZenoGem process which combines a suspended growth bio-reactor with a MF membrane system.

Another reported application of Zenon's MF technology for municipal wastewater treatment is the conversion of a 0.1 mgd sequencing batch reactor in Knowlton, N.J. into a ZeeWeed system, thereby allowing the plant to expand to 0.2 mgd and to provide advanced nitrogen removal (Waterworld, November 1995). However, the reference

does not provide any data on the effectiveness of the Zenon system in relation to TP removal from wastewater.

In a study by Kolega et al. (1991), a Memtec MF unit (0.2  $\mu$ ) was used for the treatment of secondary and primary treated effluents. The authors reported "significant" reductions in TP from 14.8 to 3.7 mg/L. The observed TP removals were attributed to the removal of bacteria which had taken up phosphorus during the biological treatment process and the particles containing phosphorus.

In another study, Oesterholt and Bult (1993) showed phosphorus removals of up to 90 percent from wastewater using MF. The MF was able to achieve effluent TP levels of as low as 0.09 mg/L.

In a different study (Zenon, 1990), Zenon Municipal Systems Inc. conducted a field demonstration study of their Cycle-Let system at the 518 Business Park WWTP in New Jersey. The field study extended from October 1989 through April 1990. In the Cycle-Let system, sodium aluminate was introduced into the middle chamber of the aerobic mixed liquor tank. Insoluble phosphorous was then removed through the ultrafiltration membrane system.

In this study, the influent phosphorous concentration ranged between 15 and 17 mg/L. The measured effluent phosphorous levels averaged approximately 0.39 mg/L and concentrations as low as 0.07 mg/L were achieved during this pilot study.

In another unpublished study conducted in early 1996 (Westbrook Outlet Mall), Zenon reported TP removals in wastewater from 14.9 mg/L to below 0.02 mg/L using ultrafiltration.

### **2.2.7 TP REMOVAL FROM LAKE WATER**

A limited number of sources containing information on the application of MF technology for lake water treatment was identified. A brief summary of the findings of the identified studies is given below.

In a number of references (Dorau and Lopez-Pila, 1994; and GRAI8121, 1979), TP removal from lake water is attributed to the removal of algae by microfiltration.

In a study by Nanny et al. (1994) soluble unreactive phosphorus (SUP) recovery rates of up to 100 percent were achieved from lake water using UF.

### **2.2.8 CHEMICAL ADDITIVES**

Alum and ferric chloride were selected as coagulants to be tested at the current EAA microfiltration pilot study Site. The following is a summary of the findings of a study by Fuller and Merrill conducted at the EAA in 1991 (report date 1993) relevant to CRA's MF pilot test.

- Alum was the most effective primary coagulant because it could obtain low TP levels (7 to 12 µg/L) and low coagulant residuals (0.5 mg/L) at relatively low Al doses, in the neighbourhood of 6 mg/L (0.22 mM). Also, alum produces less chemical sludge than iron compounds at the same molar dosage. Iron compounds could not attain these low TP residuals until higher doses were used (approximately 0.3 mM or 16 mg/L Fe).
- If lower TP residuals are needed, or evidence about aluminum toxicity in water or sludges preclude the use of alum, then iron becomes the favored coagulant. However, relatively high iron doses (>8 mg/L) will be needed to attain low TP residuals. Also, iron may be required if runoff waters are highly concentrated in TP or other coagulant-demanding substances (algae or dissolved organics, for example).

#### Summary

General information on membrane technologies and MF were summarized. In more specific terms, it was determined that there is very little published literature relating to phosphorus removal using microfiltration. However, a number of references, reporting findings of studies using membrane technologies in general, and microfiltration in particular, were accessed. The accessed literature reported findings of studies related to phosphorus removal in stormwater runoff, drinking water, wastewater, and lake water.

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### **3.0 PILOT STUDY METHODS AND PROCEDURES**

#### **3.1 DESCRIPTION OF MEMCOR AND ZENON PILOT UNITS**

During the timeframe in which the work plan for the microfiltration demonstration project was developed, the Memtec America Corporation and Zenon Environmental Inc. were among the leaders in North America in the development of full-scale commercial applications of the microfiltration treatment technology. In addition, both of these organizations had fully automated pilot units available for use. Based upon these factors, the Memtec and Zenon microfiltration pilot units were selected for testing. Descriptions of the test facilities provided by these two manufacturers are provided below.

##### **3.1.1 DESCRIPTION OF THE MEMCOR PILOT UNIT**

The Memtec America Corporation Pilot Unit, the Memcor 6M 10C system, uses a membrane filter to remove particles greater than approximately 0.2 microns from a feed stream. The main component of the unit is the filter module. Each module contains thousands of hollow fiber filtration membranes surrounded by a protective plastic screen that is sealed at both ends. The 6M 10C unit consists of six filter modules, each containing 15 square meters (161.4 square feet) of membrane surface area. The total membrane surface area for the pilot unit is equal to 968 square feet (6 x 161.4).

The Memcor unit is classified as a "dead-end" system with the entire influent flow being evenly distributed, via a manifold piping system, to the both the top and bottom of all six modules. The influent feed pump pressurizes the modules to approximately 30 psi and forces the water through the hollow fiber membranes. The permeate is collected as it is forced out from the inside of the hollow fibers. Figure 3.1 provides a diagram of the flow direction through the membrane module during normal filtration.

Filter flux is restored by means of a compressed air backwash system. Figures 3.2 and 3.3 provide diagrams showing flow directions through the membranes during normal filtration versus backwashing. During the backwash cycle, compressed air at 90 psi is forced into the filtrate side of the membrane, expanding the fibers and forcing trapped solids away from the membrane surface. Pulses of feedwater then sweep the solids away from the outer surface of the membranes. The solids and the backwash waters are then discharged from the system and deposited into a solids storage tank.

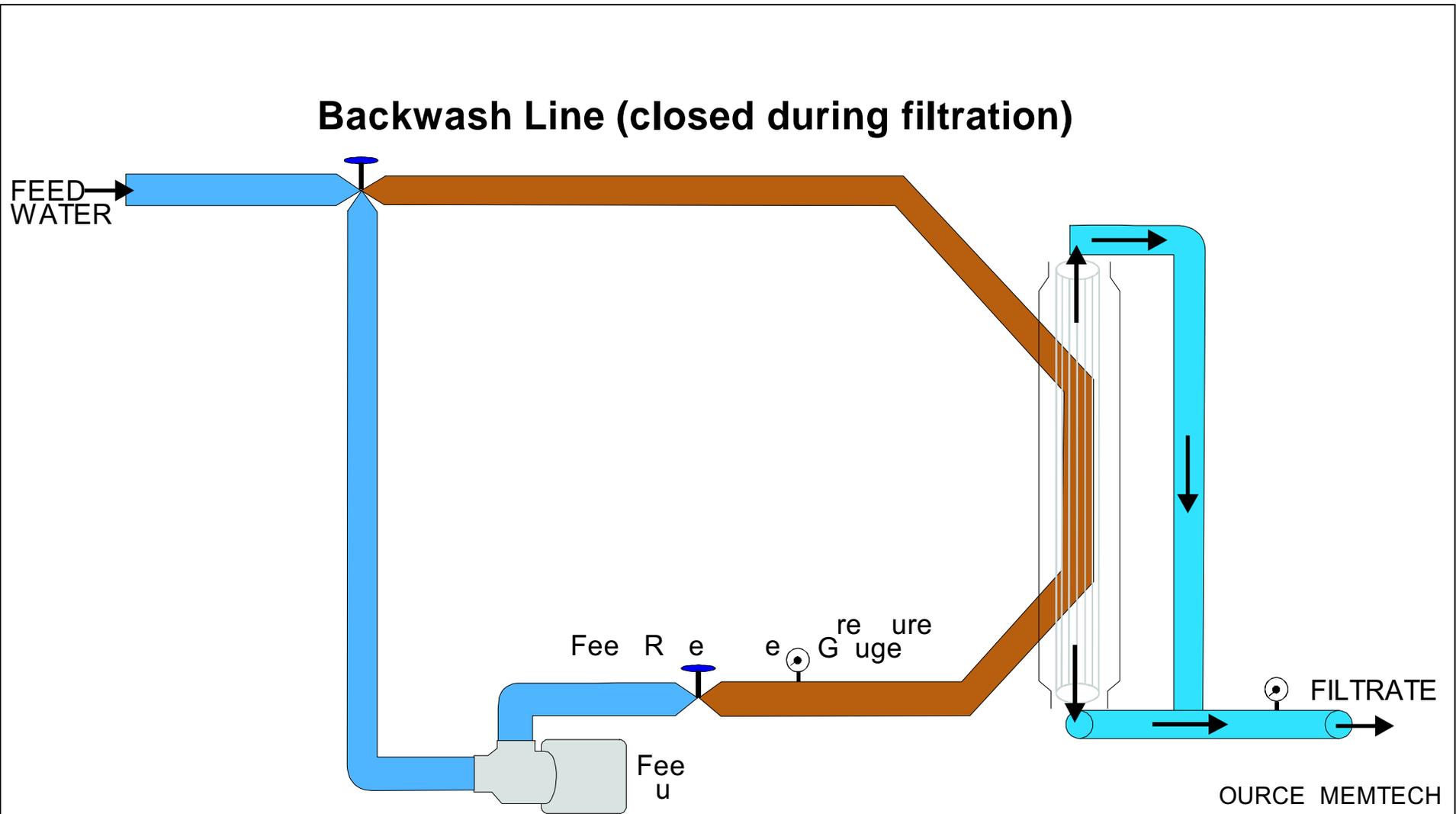
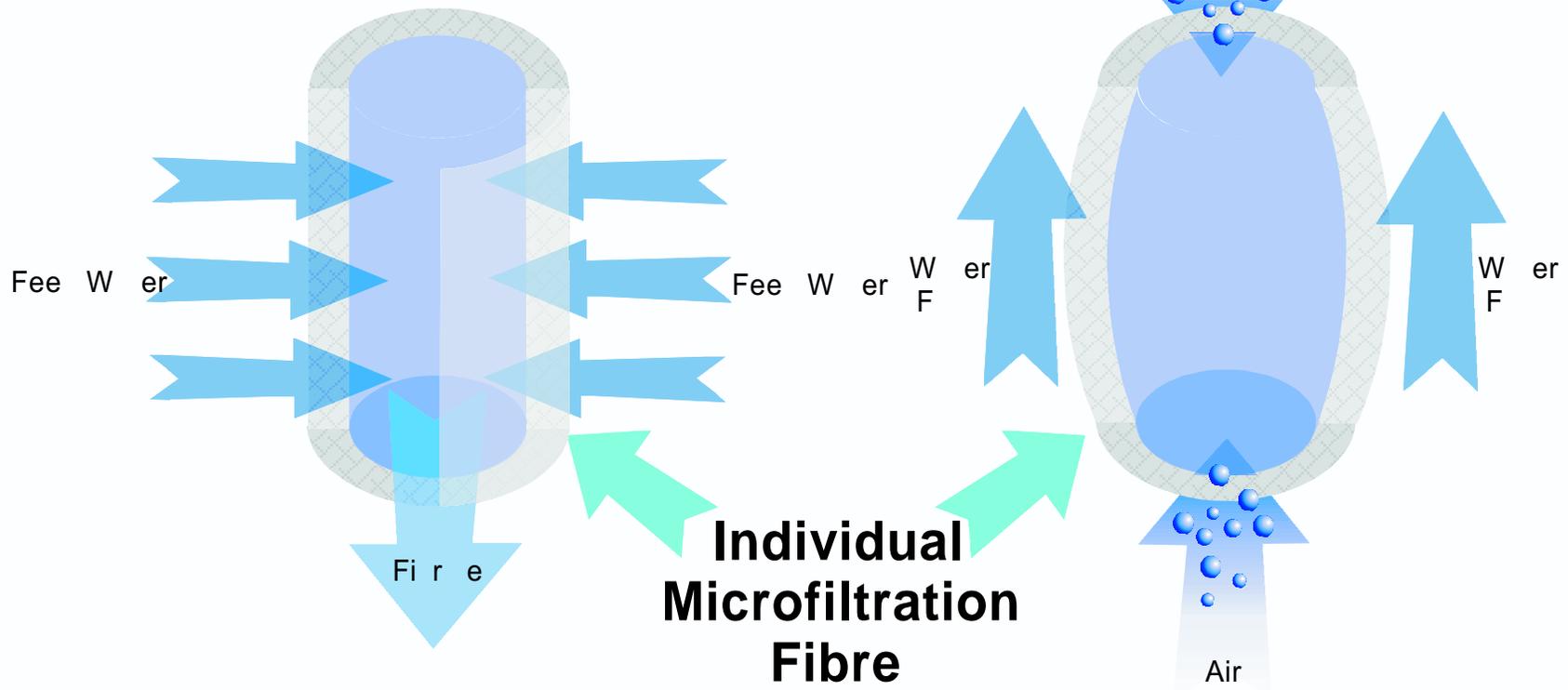


figure 3.1

DIRECTION OF FLOW THROUGH THE MEMCOR UNIT DURING NORMAL FILTRATION



**FILTRATION MODE**

**GAS BACKWASH MODE**

**Individual  
Microfiltration  
Fibre**

figure 3.

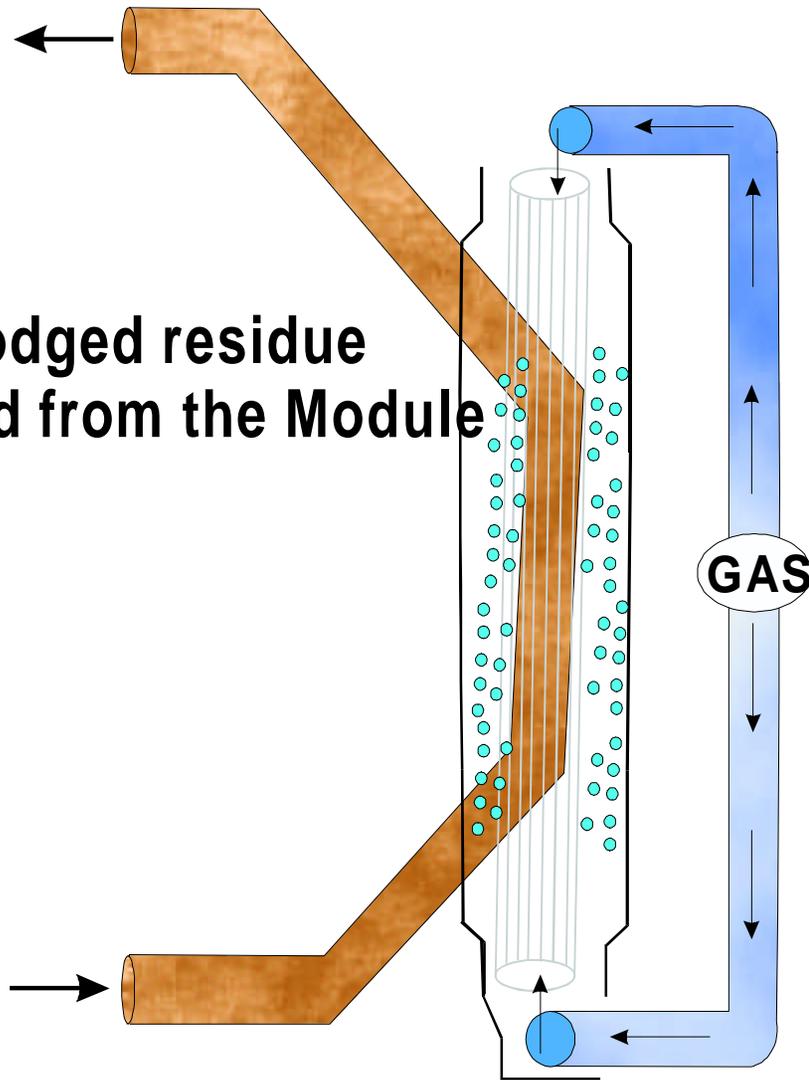
MEMCOR HOLLOW FIBER FLOW CONFIGURATION  
DURING NORMAL FLOW AND BACKWASH

**Step 2**

The dislodged residue is flushed from the Module

**Step 1**

Gas is forced into the centre and through the walls of the Fibres, lifting the accumulated debris off the surface.



SOURCE MEMTECH

figure 3.3

MEMCOR UNIT FLOW REGIME DURING BAC WA H

Operation of the Memcor pilot unit is fully automated. Numerous pneumatic and electrical switches are interconnected within the pilot unit and are managed by the programmable logic controller (PLC). The PLC automatically cycles the unit between normal filtration and backwash functions based upon pre-established pressure and/or timer settings.

Based upon the manufacturer's recommendations, the flow capacity of the Memcor unit is between 45,000 to 65,000 gallons per day. With a total of 968 square feet of membrane surface, this equates to a flux rate of between 45 to 67 gallons per square foot per day (GFD). The manufacturer's recommendation for backwash frequency ranges from every 18 to 30 minutes with approximately 100 gallons of feedwater used for each backwash event. The resulting total amount of backwash volume produced would be between 4,800 and 8,000 gallons per day representing 7 to 15 percent of the total volume of influent flow.

Figure 3.4 provides a photograph of the Memcor Pilot Unit housed in the MF field trailer.

### **3.1.2 DESCRIPTION OF THE ZENON PILOT UNIT**

The Zenon pilot unit uses hollow fibers to remove particles greater than 0.1 micron from a feed stream. Individual fibers are bound together in a "membrane cassette", with each cassette containing a total of 150 square feet of filter membrane surface area. A total of 3 cassettes are housed in the unit resulting in total membrane surface area of 450 square feet. As shown on Figure 3.5, the membranes are vertically suspended in a 1,400-liter (370-gallon) feed water tank. Feed water is pumped into the tank and a vacuum pump system draws the feed water through the membranes producing the filtrate (or permeate) stream. Using the operation mode recommended by the manufacturer, the vacuum system draws the permeate stream from both the top and the bottom of the membrane fibers. Compressed air is continuously pumped into the feed tank within at rate of between 12 to 18 cubic feet per minute. The aeration keeps solids continuously mixed within the tank and reduces solids buildup near the surface of the membranes.

The Zenon pilot unit is classified as a "cross-flow with concentrate recycle" or "feed and bleed" microfiltration system. In this configuration, the majority of the feedwater stream passes through the membrane and is collected as permeate. The remainder of the feed stream is discharged directly from the system carrying with it solids constituents that



figure 3.

MEMCOR ILOT UNIT HOUSED IN  
THE MICROFILTRATION FIELD TRAILER

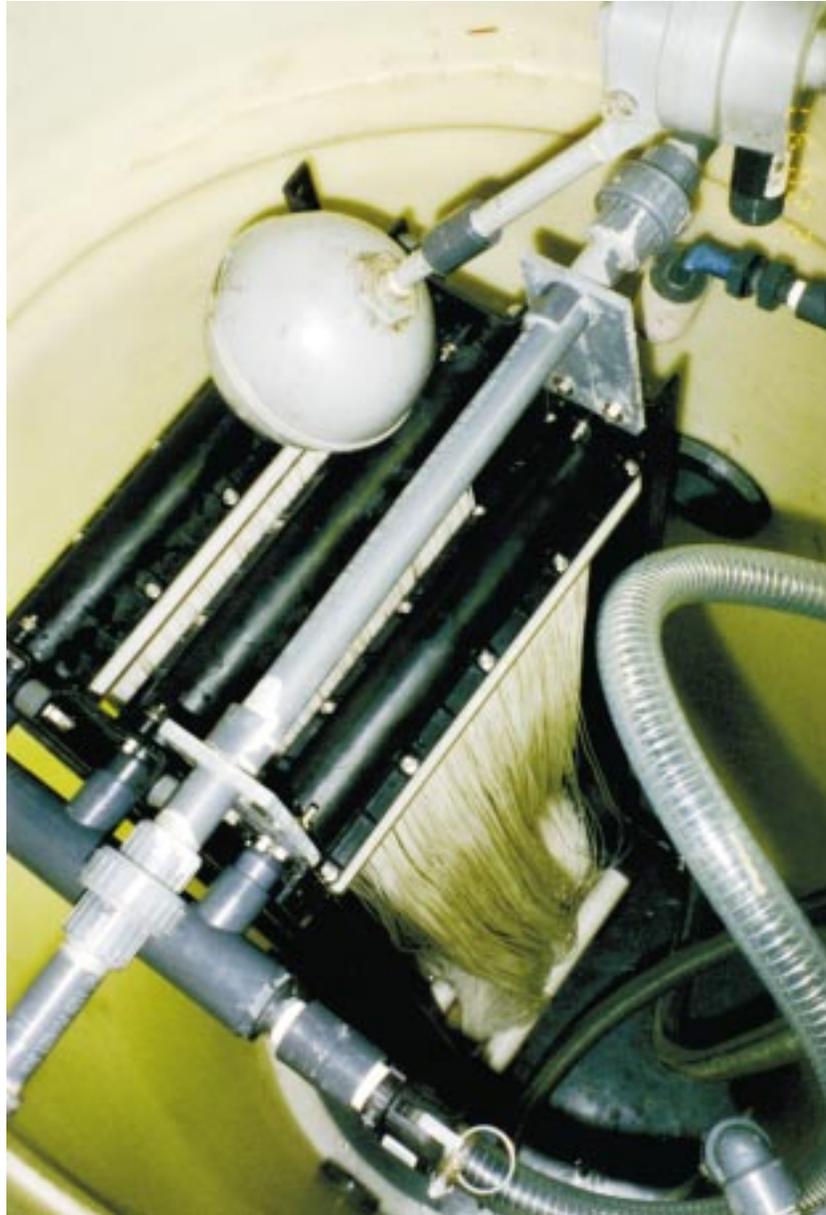


figure 3.

INTERNAL VIEW OF FEED WATER TANK  
SHOWING MEMBRANE CARTRIDGE

have been trapped by the membranes. The total volume of solids discharge water ranges from 2 to 5 percent of the feed stream volume.

Filter flux is restored by reversing the normal filtration flow regime, forcing permeate from the inside of the hollow fibers back into the feed water process tank. The manufacturer's recommendations called for a backwash interval of between 7 to 12 minutes with durations of 8 to 10 seconds.

Operation of the Zenon unit is fully automatic. Zenon's system control unit houses the program logic controller (PLC) which automatically cycles the unit between normal filtration and backwash functions using pre-established pressure and/or time settings. A photograph of the Zenon system control unit is shown on Figure 3.6.

Base upon the manufacturer's recommendations, the feed flow rate to the Zenon unit should be between 12,000 to 17,000 gallons per day. With a total of 450 square feet of membrane surface area, this equates to a flux rate of between 28 and 38 gallons per square foot per day (GFD).

### **3.1.3 COMPARISON SUMMARY OF MEMCOR VERSUS ZENON PILOT UNITS**

A summary comparison of the Memcor and Zenon Pilot Units is provided in Table 3.1.

## **3.2 PILOT UNIT OPERATING PROCEDURES**

### **3.2.1 LOCATION OF FIELD STATIONS**

To assess the ability of the microfiltration technology to remove phosphorus on both Post-BMP and Post-STA surface waters, two field locations were identified within the ENR for pilot unit testing. With the assistance of SFWMD personnel, the representative Post-BMP station was established next to the G-250 influent pump station near the bank of the ENR feed canal. The Post-STA station was located approximately 150 feet upstream of the G-251 pump station near the bank of the ENR effluent discharge canal. Figure 3.7 provides the general location of the two field stations within the ENR boundaries. Figures 3.8 and 3.9 provide the detailed site plans of the ENR influent and effluent study sites in relation to the G-250 and G-251 pump stations, respectively.

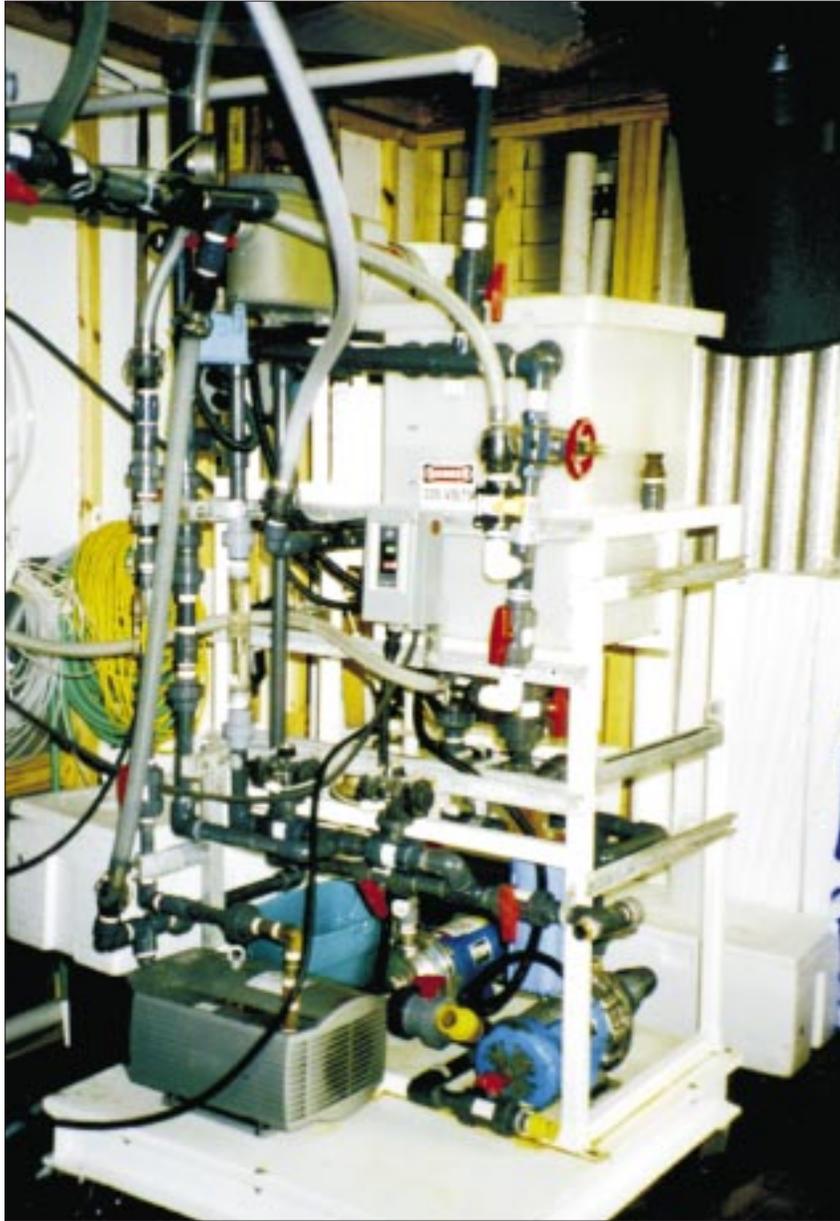


figure 3.6

ENON TEM CONTROL UNIT

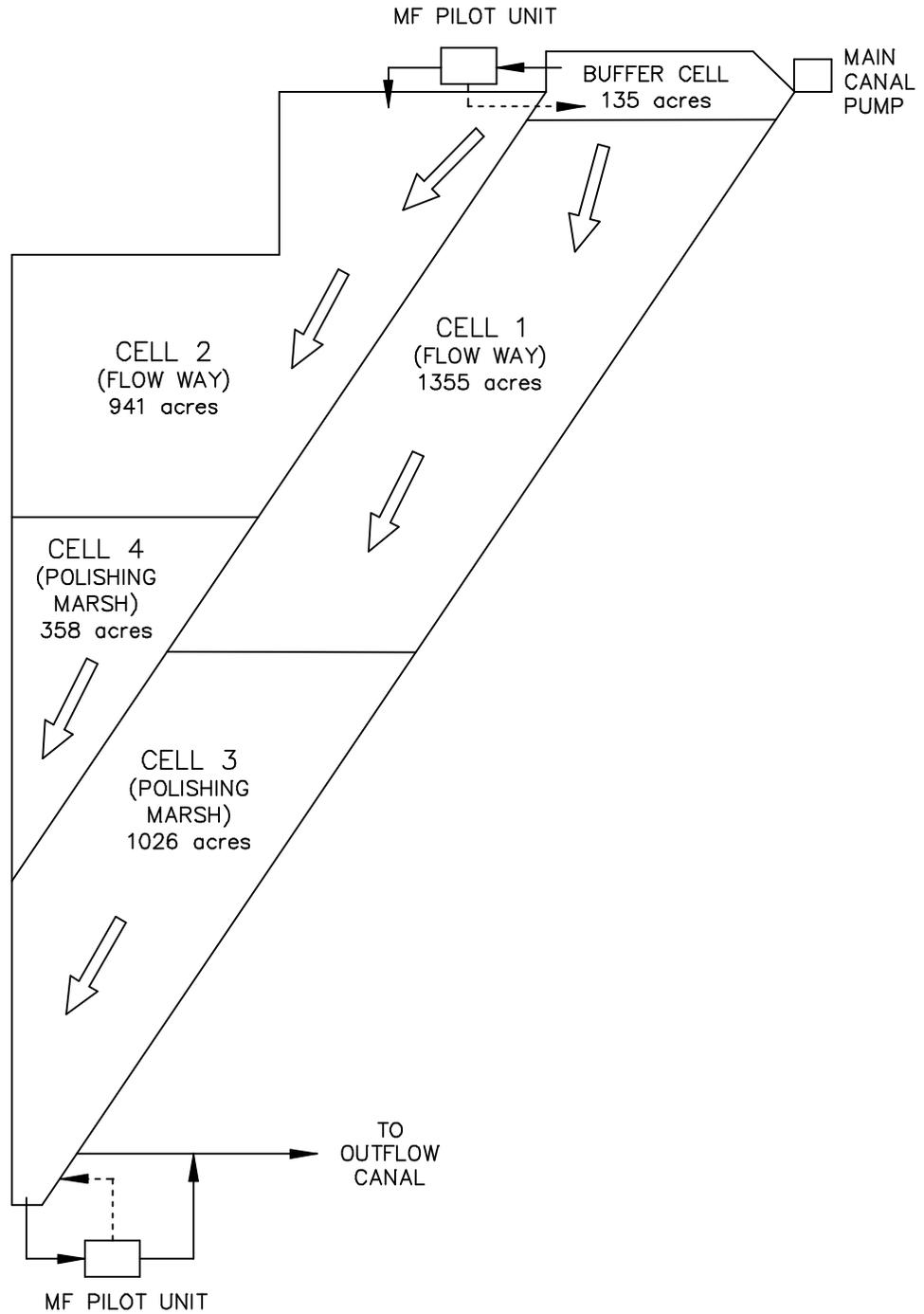


figure 3.7  
PILOT UNIT LOCATIONS WITHIN THE ENR

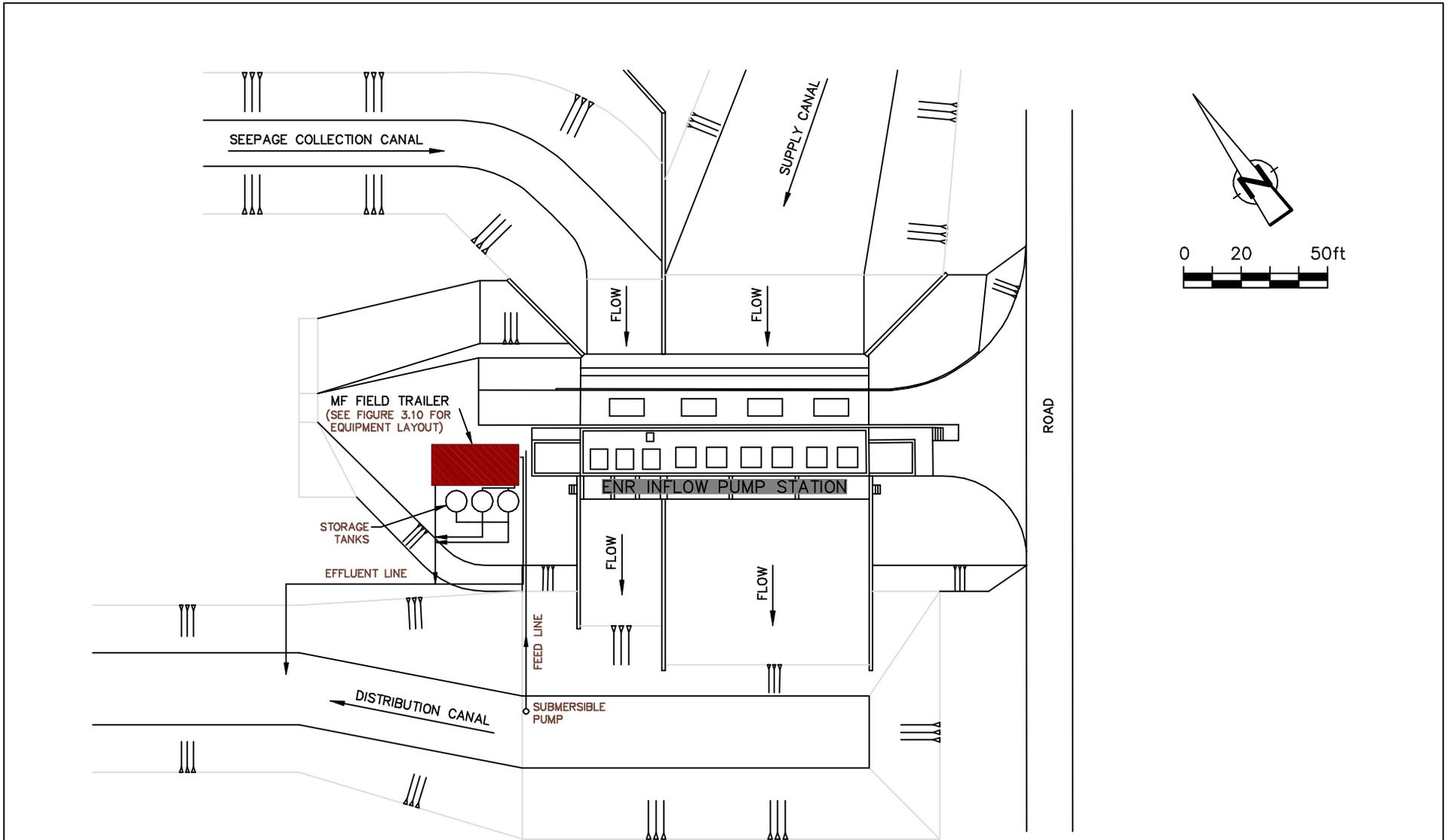


figure 3.8  
 SITE PLAN OF FIELD TRAILER  
 AT ENR INFLOW PUMP STATION

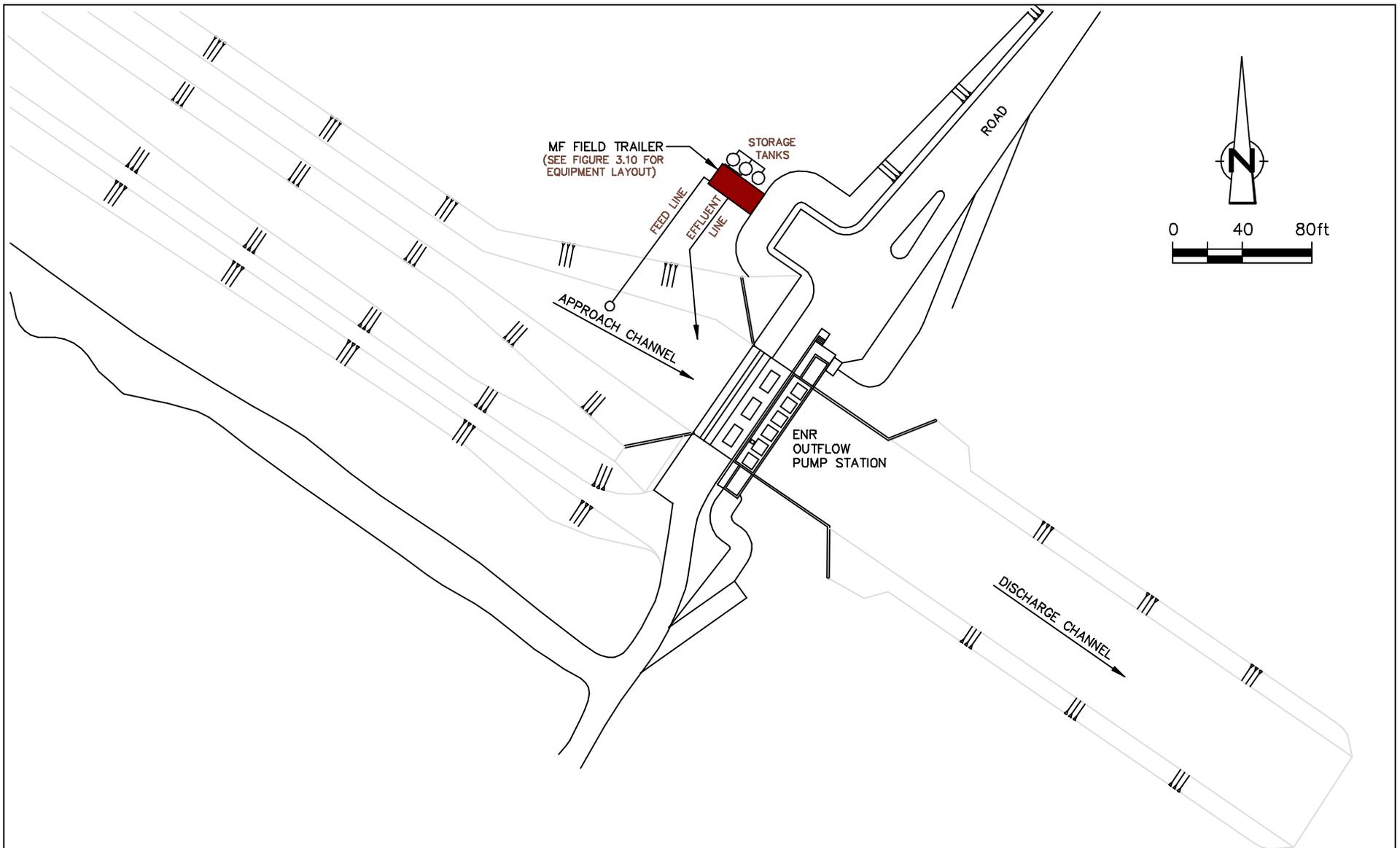


figure 3.9  
 SITE PLAN OF FIELD TRAILER  
 AT ENR OUTFLOW PUMP STATION

**TABLE 3.1****SUMMARY COMPARISON OF MEMCOR AND ZENON PILOT UNITS**

<b><i>ITEM</i></b>	<b><i>MEMCOR UNIT</i></b>	<b><i>ZENON UNIT</i></b>
RANGE OF NOMINAL FEED FLOW RATES (GALLONS/DAY)	45,000 – 65,000	12,000 – 17,000
NOMINAL FLUX RANGE (GFD)	45 – 67	28 – 38
SURFACE AREA OF MEMBRANES (SQUARE FEET)	968	450
MEMBRANE PORE SIZE (MICRONS)	0.2	0.1
FLOW CONFIGURATION	DEAD – END	CROSS-FLOW WITH CONCENTRATE RECYCLE
BACKWASH METHOD	COMPRESSED AIR WITH PULSED WATER FLUSH	REVERSE WATER FLOW USING PERMEATE
BACKWASH VOLUME PRODUCED ( percent FEED FLOW)	7 – 15 percent	2 – 5 percent
FLOW REGIME THROUGH SYSTEM	PRESSURE FEED SYSTEM	VACUUM PUMP DRAWS PERMEATE THROUGH MEMBRANE
MEMBRANE CONFIGURATION	ENCLOSED IN STEEL VESSELS	SUSPENDED IN FEED TANK
COMPRESSED AIR SUPPLY	USED TO BACKWASH SYSTEM	USED TO ACHIEVE COMPLETE MIXING IN FEED TANK

Criteria used in selecting the sites to operate the pilot unit included:

- Securing the pilot unit inside the ENR locked gate to reduce chances of vandalism;
- Positioning the facility at least 100 feet from the center line of the Water Conservation Area levee to eliminate easement concerns; and
- Making every effort to ensure the intake water for the pilot unit were representative of typical STA inflow and outflow quality.

During late September and early October 1996, the Memcor pilot unit was installed in the 14-foot by 32-foot field trailer and moved to the ENR influent location. CRA field personnel completed the plumbing connections for the Memcor unit in early October. Power to the pilot unit was derived from the ENR G-250 pump building and all electrical and water lines were buried in shallow trenches. The MF Pilot Unit was prepared for initial operation on October 8, 1996.

### **3.2.2 PILOT UNIT PROCESS DESCRIPTION**

The process flow diagram for the microfiltration pilot unit is shown on Figure 3.10. Feed waters to the pilot unit were obtained from the approximate center of the canal, at a depth of 2 feet below the water surface. An intake structure consisting of a styrofoam float and a cable/pulley system was used to suspend the intake hose in the canal center at the 2-foot depth interval. Feedwaters were drawn from the intake structure by means of a 75-gallon per minute centrifugal pump located at the canal bank and first passed through a coarse spiral wound screen with approximate 400 micron slot openings. Solids retained on this coarse filter were automatically backwashed off the screen at approximate 2-hour intervals and discharged into the solids storage tank. This coarse screen unit (Model 713, Eliminator) is manufactured by Fluid Engineering, Erie, PA.

After coarse filtering, the feed water was pumped into a 500-gallon high density polyethylene (HDPE) equalization tank contained within the field trailer. Feed waters were pumped into the bottom of the equalization tank and approximately 10 to 20 gallons per minute of excess overflow discharged continuously from the top of the tank during pilot unit operation. It was felt that this flow regime would provide a continuous, fresh source of well mixed feed waters to the pilot units. Feed waters then were pumped from equalization into the respective MF units for filtration.

Coagulant addition was accomplished by preparing appropriate concentrations of chemical stocks in 30-gallon capacity day tanks. Nominal stock concentrations of chemical coagulants were independently confirmed by laboratory analysis to ensure accuracy of feed dosage rates. Chemical metering pumps were used to meter coagulants into the feed line for the Memcor unit. A static mixing loop allowed for approximately 15 to 30 seconds of coagulant contact time with the feed waters to the Memcor unit prior to filtration. For the Zenon unit, chemical coagulants were metered directly into the 1,400-liter process tank containing the Zenon membranes. The continuous aeration of the process tank provided the required mixing for the added coagulants. The metering pump flow rates were calibrated by measuring the time required to fill a container of known volume. Volumes of coagulant fed to each pilot unit were confirmed by measuring the daily drawdown of each day tank.

Pilot unit feed flow rates were measured by the meters and flow totalizers that were provided on both the Memcor and Zenon Units. Flow meter accuracy was confirmed manually by timed measurement of the drawdown rate of the full equalization tank.

### **3.2.3 SOLIDS MANAGEMENT**

Backwash solids produced by both pilot units were pumped to nearby above ground 2,500-gallon HDPE storage tanks. The Zenon and Memcor units had separate, dedicated solids storage tanks. The solids were allowed to settle to the bottom of the tanks and the supernatant overflowed the top of the tanks and was returned to the ENR. Solids were retained for longer periods to assess settling properties and until they could be chemically characterized. Disposal of solids occurred only after full TCLP analysis was conducted to ensure they contained no hazardous substances. Arrangements were made with a licensed sanitary waste disposal organization to collect and dispose of all non-hazardous solids (2 to 4 percent solids content) into the local publicly owned wastewater treatment facility.

### **3.2.4 MEMBRANE CHEMICAL CLEANING PROCEDURES**

Cleaning of the membranes was accomplished by preparing the appropriate chemical solutions (i.e., high pH solution with surfactants, citric acid, and for the Zenon unit only, sodium hypochlorite) and flushing these solutions through the membranes. The Memcor unit cleaning was automatically accomplished by initiating a multi-stepped program that alternated between flushing the cleaning solution through membranes and



a static soaking cycle. To clean the Zenon unit, the 1,400-liter process tank was drained and approximately 20 gallons of cleaning solution was then slowly backpumped through the membranes and collected in the bottom of the process tank. Total time required for membrane cleaning was on the order of 3 to 4 hours. Spent chemical cleaning solutions were discharged to an onsite holding tank. A licensed waste hauler was contracted to remove the cleaning solutions off Site for disposal.

### **3.2.5 PILOT UNIT DATA COLLECTION**

The primary pilot unit operations data obtained and summarized on a routine basis included:

<b><i>Item</i></b>	<b><i>Method/Description</i></b>
1. Feed flow for both Memcor and Zenon	Flow meters and totalizers provided by vendors on both pilot units
2. Memcor Trans-membrane pressure (TMP)	manually recorded from digital read – out on control panel
3. Zenon permeate vacuum	manually recorded from vacuum gauge
4. Coagulant feed rate	measured by drawn-down of each chemical day tank
5. Hours of Operation	Hour run meter (Memcor) and manually recorded for Zenon
6. Backwash and bleed rates	Manually recorded based upon unit automatic settings
7. Solids production rates	Manually measured inches of solids accumulated in respective storage tanks
8. Chemical Cleanings (Types and Frequency)	Recorded chemicals used and cleaning days on summary log sheets

Completed daily log sheets and operational summary forms for both the Memcor and the Zenon Pilot Units for the entire period of operation are provided in Tables 1 through 4 of the attached Appendix 1 to the report.

### **3.2.6 SAMPLING PROTOCOLS AND ANALYTICAL PARAMETER COVERAGE**

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Prior to the commencement of pilot unit operations, a project-specific quality assurance plan was prepared and submitted to the FDEP quality assurance section for review and approval. This plan described the details of all proposed sampling procedures and defined all analytical methods to be employed. A review of the sampling and analytical techniques used during the pilot unit study are summarized below. A copy of the FDEP approved Quality Assurance Plan is provided in Appendix 2.

Sigma automatic composite samplers were used to obtain total phosphorus samples of the common influent feed to both pilot units and also the respective Memcor and Zenon Permeate streams. The autosamplers were programmed to collect 50 milliliters of sample for every 1-hour of pilot unit operation. These 50 milliliter sample aliquots were deposited into a clean 3-gallon composite jar located in the base of the autosampler. Sulfuric acid was added to each composite jar prior to sample collection, to chemically preserve the samples for total phosphorus analysis. Composite sample jars were cleaned in accordance with FDEP-approved protocols after collection of each 24-hour composite sample.

With the exception of pH, dissolved oxygen, and temperature, which require immediate analysis of simple grab samples, all other water samples were obtained by manually compositing four equal sized aliquots of sample collected periodically over a 24-hour period.

Solids and supernatant samples were collected from the solids storage tanks by use of a long hollow tube with a foot valve at the bottom. After immersing the tube completely to the bottom of each storage tank, the foot valve was closed, thus trapping the sample inside the tube. Respective layers of solids and supernatant samples were then bled into the sample bottles by slowly opening the foot valve. After each use, the tubular sampling device was cleaned in accordance with approved FDEP protocols, as listed in the Site-Specific Quality Assurance Plan.

After collection, all samples were immediately stored on ice and were held by the field technician until the laboratory courier arrived to transport the samples to the laboratory.

Savannah Laboratories of Deerfield Beach was the primary contract laboratory used for performing analyses during the pilot study investigations. Table 3.2 provides the list of

**TABLE 3.2**

**ANALYTICAL MONITORING PROGRAM FOR MF PROJECT**

<i><b>Parameter</b></i>	<i><b>EPA Analytical Method</b></i>	<i><b>Location</b></i>	<i><b>Frequency</b></i>
Total Dissolved Solids	160.1	1,3,8	Three times per week during flow
Total Solids	160.3	1,2,3,8	Three times per week during flow
Total Suspended Solids	160.2	1,2,3,4,5,8,BT4,BT5	Three times per week during flow
Total Phosphorus	365.1	1,2,3,4,5,6,8,BT4,BT5	Three times per week during flow
Total Dissolved Phosphorus	365.1	1,2,3,4,5,6,8,BT4,BT5	Three times per week during flow
Soluble Reactive Phosphorus	365.1	1,2,3,4,5,6,8,BT4,BT5	Three times per week during flow
Dissolved Oxygen	Field	2,3,8	Three times per week during flow
Temperature	Field	2,3,8	Three times per week during flow
pH	Field	1,2,3,8	Three times per week during flow
Color	110.2	1,3,8	Three times per week during flow
Total Organic Carbon	415.1	1,3,8	Three times per week during flow
Alkalinity	310.1	1,3,8	Three times per week during flow
Iron	6010	1,3,4,5,8	Three times per week during flow
Conductivity	120.1	1,3,8	Once per week during flow
Sulfate	375.4	1,3,4,5,8,BT4,BT5	Once per week during flow
Reactive Silica	370.1	1,3,4,5,8,BT4,BT5	Once per week during flow
Calcium	6010	1,3,4,5,8,BT4,BT5	Once per week during flow
Magnesium	6010	1,3,4,5,8,BT4,BT5	Once per week during flow
Zinc	6010	1,3,4,5,8,BT4,BT5	Once per week during flow
Molybdenum	6010	1,3,4,5,8,BT4,BT5	Once per week during flow
Aluminum	6010	1,3,4,5,8,BT4,BT5	Once per week during flow
Manganese	6010	1,3,4,5,8,BT4,BT5	Once per week during flow
Chloride	325.2	1,3,4,5,8,BT4,BT5	Once per week during flow
Sodium	60.0	1,3,4,5,8,BT4,BT5	Once per week during flow
Potassium	60.0	1,3,4,5,8,BT4,BT5	Once per week during flow
Mercury	7470	2,3,5,8,BT5	Every other week during flow
TKN	351.2	1,3,4,5,8,BT4,BT5	Every other week during flow
Ammonia	350.1	1,2,3,4,5,8,BT4,BT5	Every other week during flow
Nitrate-Nitrite	353.2	1,3,4,5,8,BT4,BT5	Every other week during flow
Ametryn	8141	1,3,8	Every other week during flow
2,4-D	8150	1,3,8	Every other week during flow
Atrazine	8141	1,3,8	Every other week during flow
Toxic Characteristic Leaching Procedure (TCLP)		5	One composite at end of test period

Location Code: 1 = Pre-Screened Influent; 2 = Screened Influent; 3 = Memcor Effluent, 4 = Memcor Backwash Supernatant; 5 = Memcor Solids; BT4 = Zenon Backwash Supernatant; BT5 = Zenon Solids; 6 = Spent Chemical Cleaning Solutions; 8 = Zenon Effluent

analyses performed by Savannah and also indicates the respective analytical protocols employed by the lab.

Table 3.2 also provides a listing of the specific analyses performed on the various pilot unit sample locations. Table 5 in Appendix 1 provides a daily summary of all analyses performed by Savannah laboratories.

### **3.2.7 ADDITIONAL TESTING CONDUCTED DURING THE PILOT STUDY INVESTIGATIONS**

#### **3.2.7.1 TRACE LEVEL MERCURY ANALYSES PERFORMED IN ADDITION TO THE ROUTINE MERCURY TESTS**

Routine analyses for mercury, using the standard cold vapor technique with a 0.0002 mg/L reporting limit, were carried out on a routine basis in accordance to the frequency specified in Table 3.2. In addition to these routine mercury analyses, trace level total and methyl mercury analyses were also collected periodically during the field project. These additional mercury samples were collected directly by the South Florida Water Management District. The SFWMD submitted these analyses to the FDEP laboratory and Frontier Geoscience Lab to complete the low level mercury tests.

#### **3.2.7.2 BIOTOXICITY AND ALGAL GROWTH POTENTIAL (AGP) TESTING**

Feed and permeate samples were also periodically collected for algal growth potential (AGP) and biotoxicity testing. All of these samples were collected by the pilot unit field personnel and submitted to the FDEP biology laboratory in Tallahassee, Florida for analyses. Three different toxicity tests were performed: 7-day chronic estimator using bannerfin shiner (*Cyprinella leedsii*) and the water flea (*Ceriodaphnia dubia*); and a 96-hour growth test using the unicellular green algae, *Selenastrum capricornutum*. Tests were performed following U.S. EPA guidelines but substituting *C. leedsii* for the fathead minnow, (*Pimephales promelas*) (EPA/600/4-91/002). The AGP tests were also performed following U.S. EPA test protocols (EPA-600/9-78-018). The FDEP report summarizing their bioassay and AGP results is provided in Appendix 3.

#### **4.0 MF PILOT STUDY RESULTS AND MAJOR FINDINGS**

As previously indicated, the MF pilot unit was operated at both the ENR influent and effluent locations under a variety of conditions during the field investigation period of October 1996 through the beginning of September 1997. During part of this time, the pilot unit was located at the ENR influent location, near the G-250 pump station. Alternately, the pilot unit was located at the ENR effluent station, near the G-251 pump station.

The Memcor unit was operated a total of 2,965 hours during this entire time period and the Zenon unit was operated for of 2,084 hours. The Zenon unit logged less total hours than the Memcor because it was not installed into the field trailer until March 21, 1997. A summary of the specific conditions that the Zenon and Memcor units were operated under during the field investigations are provided in Table 4.1.

During the experimental trials, varying doses of ferric chloride, alum and polyaluminum chloride were added to the pilot unit feed stream to determine the lowest dosage that would result in an effluent total phosphorus stream of 10 parts per billion.

Backwash frequencies and membrane throughputs (GFDs) were varied to determine respective settings that would produce the highest membrane yields in conjunction with the longest uninterrupted run times between flux restoration (i.e., chemical cleaning).

#### **4.1 DATA MANAGEMENT METHODS AND TECHNIQUES**

At the onset of the project, two laboratories were contracted for analytical work. Everglades Laboratory of West Palm Beach was the primary analytical laboratory and Savannah Laboratory of Deerfield Beach was identified as the back-up lab. On November 22, 1996, Savannah Laboratory was made the primary laboratory and all remaining analyses on the study were completed by Savannah. The switch to Savannah was primarily made because of greater analytical capacity and also due to the fact that Savannah had more total phosphorus threshold analytical experience. Since the change in laboratories was made near the onset of the project, there was no adverse impact on the quality of the data collected. Data from both laboratories was of acceptable quality and was used in evaluating the MF process.

Analytical data that was received from the laboratory was entered into a spreadsheet format and summarized on a daily basis. Table 5 of Appendix 1 provides all of these

**TABLE 4.1**  
**SUMMARY OF ZENON AND MEMCOR OPERATING CONDITIONS**

<b>Time Frame</b>	<b>Target Flow (GPM)</b>		<b>Target Flux (GFD)</b>		<b>Backwash Frequency</b>		<b>Coagulant Type</b>	<b>Target Coagulant Dose (mg/L)</b>
	<b>Memcor</b>	<b>Zenon</b>	<b>Memcor</b>	<b>Zenon</b>	<b>Memcor (hrs.)</b>	<b>Zenon (hrs.)</b>		
Oct. 30 – Nov. 21, 1996 @ ENR INFLUENT	50	--	80-90	--	0.3-0.5	--	None	--
Jan. 2 – Feb. 14, 1997 @ ENR INFLUENT	45	--	70-76	--	0.3-0.5	--	Ferric Chloride	3 – 8 as Fe
Mar.21 – Apr. 1, 1997 @ ENR EFFLUENT	40	10	70	32	0.3	0.2	Ferric Chloride	3 as Fe
Apr. 1 – Apr. 26, 1997 @ ENR EFFLUENT	40	10	50-70	20	0.33	0.17	None	--
Apr.26 – May 23, 1997 @ ENR EFFLUENT	30	9-10	45-50	20-30	0.3-0.33	0.125	Alum	1-3 as Al
June 6 – June 19, 1997 @ ENR EFFLUENT	30	8-9	48	21-29	0.3	0.125	Ferric Chloride	3-5 as Fe
June 26 – July 28, 1997 @ ENR INFLUENT	32	8-9	52	20-25	0.33	0.125	Ferric Chloride	8-10 as Fe
July 29-Aug.18, 1997 @ ENR INFLUENT	30-32	8-9	52	25	0.33	0.1	Alum	5-10 as Al
Aug.18 – Sept. 2, 1997 @ ENR INFLUENT	30	9	50	25	0.33	0.1	Polyaluminum Chloride	6 as Al

daily spreadsheet summaries. In all, more than 7,270 analytical data points (2,200 more than required by the contract) were obtained during the pilot unit investigations. Of this number, 20 data points (less on 0.3 percent of the total) were determined to be outliers and were not used in developing data summaries or in making conclusions regarding the MF technology. Each of the 20 outliers has been identified in Table 5 of Appendix 1. The majority of the outliers were associated with effluent data points that were higher than the related influent information. A few data points were also eliminated because they were significantly higher (e.g., 5 to 10 times) than the mean value for the data set. Statistical analyses performed on analytical data included:

- Arithmetic Mean;
- Maximum data set value;
- Minimum data set value; and
- Analysis of Variance (ANOVA) for comparing MF influent versus effluent data.

#### **4.2 PHOSPHORUS FORMS ANALYZED AND SUMMARY RESULTS**

Soluble reactive phosphorus (SRP), total dissolved phosphorus (TDP) and total phosphorus (TP) were all analyzed during the pilot investigations on representative samples of feed waters and MF permeate as well as on generated solids. The definitions employed by the 19<sup>th</sup> edition of Standard Methods (APHA, et al.) were used to classify and analyze the phosphorus forms during the subject investigations. Soluble reactive phosphorus is defined as all phosphorus that passes through a 0.45 micron filter (field filtered) which forms a blue colored complex when the colorizing agent is added directly to a sample, without any further digestion or sample preparation. Total dissolved phosphorus samples are field filtered (0.45 micron) and subjected to a strong acid digestion in the laboratory, which is followed by the colorization process. Total phosphorus samples are collected without field filtration, preserved at the onset with sulfuric acid to a pH of less than 2, digested with a strong acid solution in the laboratory and colorized at the end of the procedure.

For all of these phosphorus forms, the intensity of the blue color measured on a spectrophotometer is proportional to the amount of phosphorus contained in the respective samples.

The average concentrations of SRP, TDP, and TP observed at the ENR influent and effluent sampling stations during the MF pilot investigation are provided in Table 4.2.

<b>TABLE 4.2</b>						
<b>AVERAGE CONCENTRATIONS OF THE VARIOUS PHOSPHORUS FORMS OBSERVED AT THE ENR INFLUENT AND EFFLUENT SAMPLING STATIONS</b>						
<b>SAMPLING LOCATION</b>		<b>AVERAGE PHOSPHORUS RESULTS (mg/L AS P)</b>				
		<b>SRP</b>	<b>SRP (percent of Total P)</b>	<b>TDP</b>	<b>TDP (percent of Total P)</b>	<b>TP</b>
ENR INFLUENT (DRY SEASON; 10/30/96 TO 2/14/97)	Average	0.027		0.021		0.043
	Max	0.06		0.045		0.11
	Min	0.011	63	0.009	49	0.003
	N	12		9		36
	SD	0.014		0.012		0.029
ENR EFFLUENT (WET SEASON; 3/21/97 – 6/19/97)	Average	0.004		0.018		0.021
	Max	0.0110.004		0.038		0.039
	Min	26	19	0.002	86	0.011
	N	0.0014		26		30
	SD			0.0069		0.0055
ENR INFLUENT (WET SEASON; 6/26/97-9/15/97)	Average	0.015		0.035		0.060
	Max	0.064		0.08		0.20
	Min	0.004	25	0.0078	58	0.014
	N	46		45		48
	SD	0.019		0.020		0.035

(Note: N denotes to the number of data points used to compute the average and SD is the standard deviation)

The soluble reactive phosphorus in the ENR influent feed waters varied considerably from the historical wet season compared to the dry season. During the dry season, the SRP was equal to 0.027 mg/L as P or roughly 63 percent of the average total phosphorus measured in all feed samples collected during this time period. During the wet season, the SRP average concentration was 0.015 mg/L as P which was equal to 25 percent of the total phosphorus average.

The ENR effluent waters contained low concentrations of SRP and averaged 0.004 mg/L on all samples analyzed during this time period.

In all samples obtained at both the ENR influent and effluent locations, the total dissolved phosphorus content was equal to roughly 50 percent, or more, of the total phosphorus concentration. This high concentration of TDP suggests that the majority of the phosphorus contained in these waters consists of very finely divided organically complexed P that is capable of passing through a 0.45 micron filter.

The TDP and SRP results for MF permeate samples were extremely low and typically below their respective laboratory reporting limits. The majority of the meaningful data evaluations related to phosphorus removal via the microfiltration process are associated with the total phosphorus concentrations recorded in feed and permeate samples.

**4.3 MF STUDY TOTAL PHOSPHORUS RESULTS  
COMPARED TO SFWMD DATA**

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The South Florida Water Management District routinely collects flow weighted composite samples for phosphorus at their ENR 002 (ENR influent) and ENR 012 (ENR effluent) sampling stations. Both of these sampling stations were within 150 feet of the respective MF Pilot unit sampling locations and both of the sampling stations (SFWMD and the MF Field Trailer) possessed 24 hour composite samplers to obtain representative samples. A comparison of the Total phosphorus data collected and analyzed by the SFWMD and the data independently obtained as part of the MF investigations for comparable time periods are provided below:

<b><i>Time Period</i></b>	<b><i>Average SFWMD Lab Analytical Data Total P (mg/L as P)</i></b>	<b><i>MF Study Average Total P (mg/L as P)</i></b>
---------------------------	---	--

10/30/96 to 2/14/97 2 ENR Influent Station	0.070 (N=12)	0.043 (N=36)
3/21/97 to 6/19/97 @ ENR Effluent Station	0.013 (N=11)	0.021 (N=30)
6/26/97 to 9/15/97 ENR Influent Station	0.079 (N=9)	0.060 (N=48)

The differences between the SFWMD and the MF study values, provided above, can primarily be attributed to the frequency of sample collection. The SFWMD data is collected and reported only when the ENR pumps are operating and water is flowing in the canals. The SFWMD ENR 002 and 012 sampling stations both possess flow actuators that initiate sample collection during periods of measurable flow (e.g., greater than 0.1 feet per second of mean canal water velocity). The MF pilot unit was collecting samples irrespective of ENR pumping, or canal flow operations. Higher total phosphorus values would be anticipated during ENR pumping than during quiescent periods when particulate phosphorus would have a greater tendency to settle out of the water column. Any full-scale treatment systems would be operating not only during heavy rainfall and surface water pumping events, but also would be treating surface waters stored in retention or equalization basins. Obtaining data and operating the pilot unit during stagnant canal conditions is considered to be representative of the treatment protocols that would be established for a full-scale MF application in the EAA.

#### **4.4      PHOSPHORUS REMOVAL RESULTS**

A summary of the phosphorus removal results using microfiltration alone and microfiltration coupled with low dosages of chemical coagulants are provided in Tables 4.3 and 4.4.

##### **4.4.1      ENR INFLUENT RESULTS**

Table 4.3 summarizes the phosphorus removal results obtained during the time period the MF pilot unit was treating Post-BMP waters while located at the ENR influent

**TABLE 4.3  
TOTAL PHOSPHORUS REMOVAL SUMMARY AT ENR INFLUENT (G-250 LOCATION)**

Coagulant	Dose Range (mg/L)		MEMCOR		ZENON	
			Total Phosphorus (mg/L as P)	Filtrate	Total Phosphorus (mg/L as P)	Filtrate
None <i>Feed TP concentration 0 to 50 ug/L</i>		Average	0.033	0.016		
		Max	0.049	0.035		
		Min	0.010	0.002		
		N	16	16		
		S.D.	0.015	0.010		
None <i>Feed TP concentration 50+ ug/L</i>		Average	0.081	0.033	0.072	0.017
		Max	0.110	0.080	0.094	0.031
		Min	0.060	0.002	0.049	0.002
		N	12	13	4	5
		S.D.	0.016	0.025	0.019	0.014
Alum	1 - 3 mg/L as Al	Average	0.109	0.014		
		Max	0.140	0.018		
		Min	0.077	0.010		
		N	2	2		
		S.D.	0.045	0.006		
	3 - 6 mg/L as Al	Average	0.078	0.008	0.078	0.012
		Max	0.092	0.013	0.140	0.017
		Min	0.052	0.006	0.031	0.002
		N	6	6	7	7
		S.D.	0.015	0.003	0.035	0.005
	6 - 9 mg/L as Al	Average	0.048	0.012	0.063	0.011
		Max	0.055	0.020	0.084	0.018
		Min	0.031	0.006	0.051	0.006
		N	4	4	7	7
		S.D.	0.011	0.006	0.014	0.005
	9 - 16 mg/L as Al	Average	0.059	0.005		
		Max	0.061	0.007		
		Min	0.057	0.002		
		N	2	2		
		S.D.	0.003	0.004		
FeCl3	0 - 4 mg/L as Fe	Average	0.037	0.007		
		Max	0.090	0.017		
		Min	0.003	0.002		
		N	6	7		
		S.D.	0.030	0.007		
	4 - 8 mg/L as Fe	Average	0.040	0.004	0.028	0.003
		Max	0.060	0.006	0.052	0.006
		Min	0.017	0.002	0.014	0.002
		N	8	8	5	5
		S.D.	0.019	0.001	0.014	0.002
	8 - 12 mg/L as Fe	Average	0.038	0.005	0.042	0.007
		Max	0.098	0.010	0.098	0.014
		Min	0.014	0.002	0.017	0.002
		N	15	15	13	13
		S.D.	0.028	0.003	0.029	0.004
	12 - 16 mg/L as Fe	Average	0.018	0.003		
		Max	0.030	0.003		
		Min	0.013	0.003		
		N	4	4		
		S.D.	0.008	0.000		
PAC	5 - 8 mg/L as Al	Average	0.086	0.010	0.086	0.012
		Max	0.200	0.020	0.200	0.027
		Min	0.051	0.002	0.051	0.002
		N	9	9	9	9
		S.D.	0.046	0.006	0.046	0.008

Notes:

1. One-half of the method detection limit (MDL) was used for calculations when the parameter concentration was less than the MDL
2. Average = arithmetic mean; Max = maximum value found in related data set; Min = minimum value found in related data set  
N = number of data points; S.D. = standard deviation
3. Missing data a result of the Zenon test unit being added several months after testing commenced with the Memcor unit

**TABLE 4.4  
TOTAL PHOSPHORUS REMOVAL SUMMARY AT ENR EFFLUENT (G-251 LOCATION)**

Coagulant	Dose Range (mg/L)		MEMCOR		ZENON	
			Total Phosphorus (mg/L as P)		Total Phosphorus (mg/L as P)	
			Feed	Filtrate	Feed	Filtrate
None		Average	0.024	0.011	0.023	0.013
		Max	0.039	0.015	0.039	0.026
		Min	0.011	0.008	0.011	0.007
		N	7	6	6	5
		S.D.	0.009	0.003	0.010	0.008
Alum	1 - 2 mg/L as Al	Average	0.022	0.013	0.021	0.011
		Max	0.029	0.017	0.024	0.016
		Min	0.016	0.011	0.018	0.008
		N	4	4	4	4
		S.D.	0.006	0.003	0.003	0.003
	2 - 4 mg/L as Al	Average	0.021	0.009	0.021	0.011
		Max	0.028	0.016	0.028	0.018
		Min	0.016	0.005	0.016	0.008
		N	8	8	4	4
		S.D.	0.004	0.003	0.005	0.005
FeCl3	1 - 2 mg/L as Fe	Average	0.024	0.006	0.019	0.012
		Max	0.024	0.008	0.023	0.017
		Min	0.023	0.004	0.017	0.006
		N	2	2	4	4
		S.D.	0.001	0.003	0.003	0.005
	2 - 4 mg/L as Fe	Average	0.020	0.010	0.021	0.008
		Max	0.025	0.027	0.025	0.012
		Min	0.016	0.005	0.014	0.006
		N	7	7	7	6
		S.D.	0.003	0.008	0.004	0.002
FeCl3	4 - 6 mg/L as Fe	Average	0.018	0.006		
		Max	0.022	0.010		
		Min	0.014	0.002		
		N	2	2		
		S.D.	0.006	0.005		

Notes:

1. One-half of the method detection limit (MDL) was used for calculations when the parameter concentration was less than the MDL.
2. Average = arithmetic mean; Max = maximum value found in related data set; Min = minimum value found in related data set; N = number of data points; S.D. = standard deviation.
3. Missing data a result of the Zenon test unit being added several months after testing commenced with the Memcor unit.

station. During time periods when no coagulants were fed to the system, microfiltration alone removed a significant amount of the total phosphorus. As shown in the table, for Post-BMP feed waters averaging less than 50 ppb of total phosphorus, the Memcor unit removed roughly one-half of the influent phosphorus. On an average feed concentration of 0.033 mg/L of total phosphorus, the Memcor unit produced a permeate concentration of 0.016 mg/L total phosphorus, which is equivalent to a P removal rate of 51 percent. For Post-BMP waters containing greater than 50 ppb of total phosphorus (an average of 0.081 mg/L of total phosphorus), microfiltration alone removed between 60 and 80 percent of total P. For these higher phosphorus feed waters, the Zenon unit produced a permeate containing 0.017 mg/L of P (79 percent removal) and the Memcor permeate contained 0.033 mg/L P (59 percent removal).

During the time period the pilot unit was operated at the ENR Influent location, total ENR influent total phosphorus concentrations typically ranged from a low of 0.025 to a maximum of 0.2 mg/L. It would be difficult to extrapolate the MF results obtained to higher Post-BMP total phosphorus concentrations that may occasionally be observed as a result of peak rainfall events and extremely high (i.e., 0.25 to 0.4 mg/L) total phosphorus concentrations.

Table 4.3 also provides the Post-BMP phosphorus removal results for MF coupled with the chemical coagulants alum, ferric chloride and polyaluminum chloride.

Ferric chloride doses in the range of 8 to 12 mg/L as Fe produced an average permeate effluent of 0.0007 mg/L of total P for the Zenon unit and 0.005 mg/L of total P for the Memcor. Even lower doses of ferric chloride reduced the total P in the permeate to levels ranging from 0.004 to 0.007 mg/L, however, these results were obtained on feed waters containing relatively low average total P concentrations (0.018 to 0.040 mg/L as P).

Alum doses ranging from 9 to 16 mg/L as Al resulted in an average concentration of 0.005 mg/L of total phosphorus in the Memcor during Post BMP testing. As shown in the Table 4.1, while lower doses of alum periodically produced permeates of less than 0.01 mg/L of total P, consistently low total P results were not achieved until the dosage was increased from between 9 to 16 mg/L.

A proprietary formulation of polyaluminum chloride (PAC), General Chemical's Hyper Ion 1090, was also used as a coagulant during Post-BMP testing. A PAC dosage range of 5 to 8 mg/L as Al produced MF total phosphorus permeates of 0.012 mg/L for the Zenon and 0.01 for the Memcor. The PAC coagulant trials produced similar results to

the testing performed with Alum and no appreciable differences could be observed on the relative effectiveness of the two compounds with respect phosphorus removal rates.

Table 4.3 compares the results obtained with the Zenon unit versus the Memcor facility on test trials using similar ferric chloride, alum and PAC coagulants dosages. Averaging the Table 4.3 total P filtrate results for both test units provides the following relationship:

<i><b>Coagulant</b></i>	<i><b>Dosage Range (mg/L as element)</b></i>	<i><b>Total Phosphorous (mg/L as P) in Filtrate</b></i>	
		<i><b>Zenon</b></i>	<i><b>Memcor</b></i>
Alum	3 – 9	0.012	0.010
Ferric Chloride	4 – 12	0.005	0.005
PAC	5 – 8	0.012	0.010

With regards to the data provided above, it should be noted that only one coagulant was tested, at any given time, and the numerical comparisons show the relative response to the same feed waters of the Zenon versus the Memcor units.

Slightly higher phosphorus removal was observed with the Memcor unit over the Zenon unit, on average, when Alum and PAC were used and virtually identical results were obtained when using ferric chloride. In general, the data shows there were no appreciable differences between the relative phosphorus removal performance between the Zenon and the Memcor test units.

#### **4.4.2 ENR EFFLUENT RESULTS**

Table 4.4 summarizes the phosphorus removal results obtained during the time period the MF field trailer was treating Post-STA waters while located at the ENR Effluent station. During time periods when no coagulants were fed to the MF units at the effluent station, microfiltration alone removed roughly 45 to 55 percent of the feed total P concentration. As shown in Table 4.4, the Zenon produced a permeate concentration of 0.013 mg/L as P and the Memcor recorded a concentration of 0.011 mg/L using microfiltration alone with no chemical addition. Average total P in the feedwaters during these trials was equal to 0.024 mg/L as P.

Ferric chloride dosages as low as 2 to 4 mg/L as Fe produced MF total phosphorus permeates of 0.008 mg/L for the Zenon and 0.010 mg/L for the Memcor.

Alum doses ranging from 2 to 4 mg/L resulted in a total phosphorus concentration of 0.011 mg/L P for the Zenon unit and 0.009 for the Memcor.

Average Table 4.4 total P filtrate results for both pilot test units are provided below:

<b><i>Coagulant</i></b>	<b><i>Dosage Range (mg/L as element)</i></b>	<b><i>Total Phosphorus (mg/L as P) in Filtrate</i></b>	
		<b><i>Zenon</i></b>	<b><i>Memcor</i></b>
Ferric chloride	2 – 4	0.008	0.010
Alum	2 – 4	0.011	0.009

With regards to the data provided above, it should be noted that only one coagulant was tested, at any given time, for both the Memcor and Zenon units.

The PAC tests were completed at the influent test site. PAC was not included as part of the testing in the workplan but was added late in the study period after the pilot unit had been moved back to the ENR Influent test location.

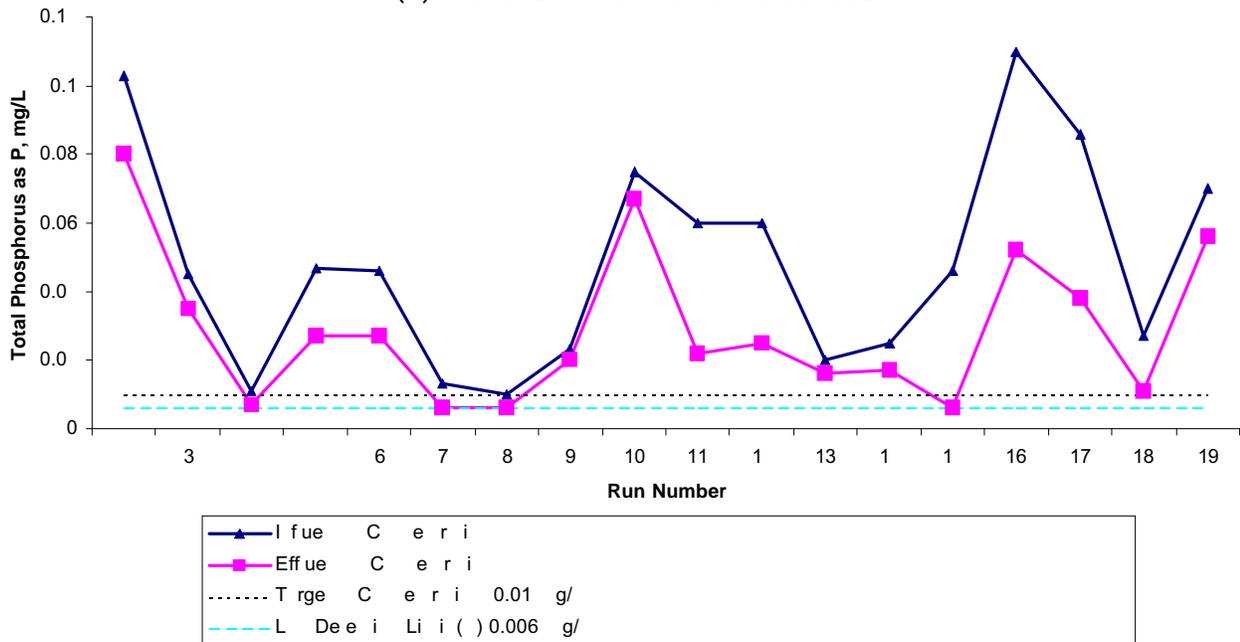
The data summaries provided in Tables 4.3 and 4.4 indicate that ferric chloride coagulation coupled with microfiltration produce comparable total phosphorus results in permeate samples compared to alum coagulation and that there was no significant differences in the relative performance of the Zenon and Memcor MF units.

#### **4.5 PHOSPHORUS CONCENTRATIONS AND COAGULANT TIME SERIES GRAPHS**

The enclosed Figures 4.1 through 4.5 provide graphical presentations of the total phosphorus feed and filtrate concentrations in conjunction with the coagulant dosage rates for the entire MF pilot study investigation period. Graphical results for both the Memcor and the Zenon units are provided in these figures.

Figure 4.1a shows the results obtained at the ENR influent locations (G-250 Pump Station) using no coagulant. The wide variation observed in the feed phosphorus concentration is apparent as feed phosphorus concentrations ranged from slightly more than 0.1 mg/L to less than 0.02 mg/L. Figure 4.1a also visually shows a relatively good

(A) MICROFILTRATION USING NO COAGULANT



(B) MICROFILTRATION COUPLED WITH FeCl<sub>3</sub> COAGULANT ADDITION

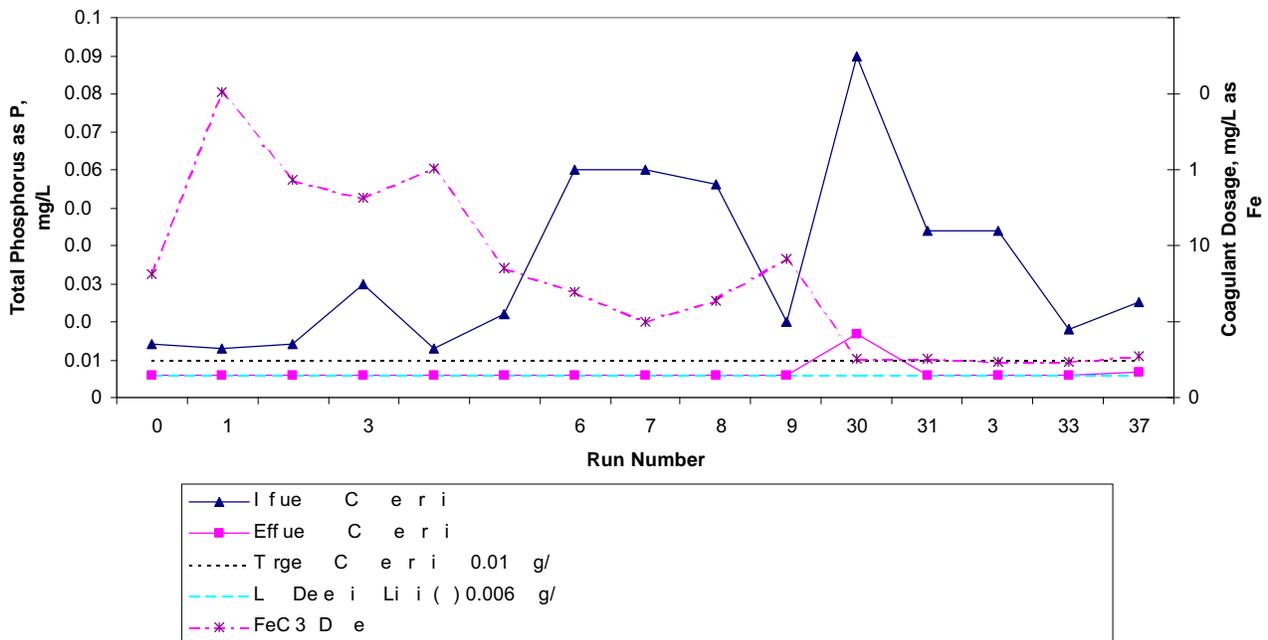
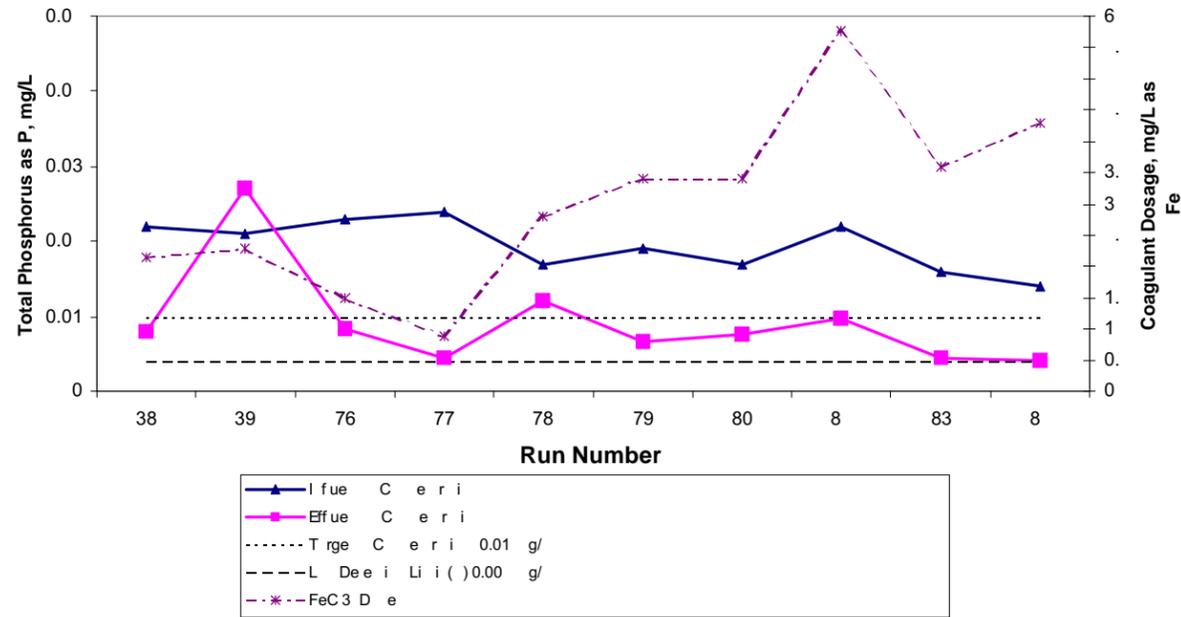


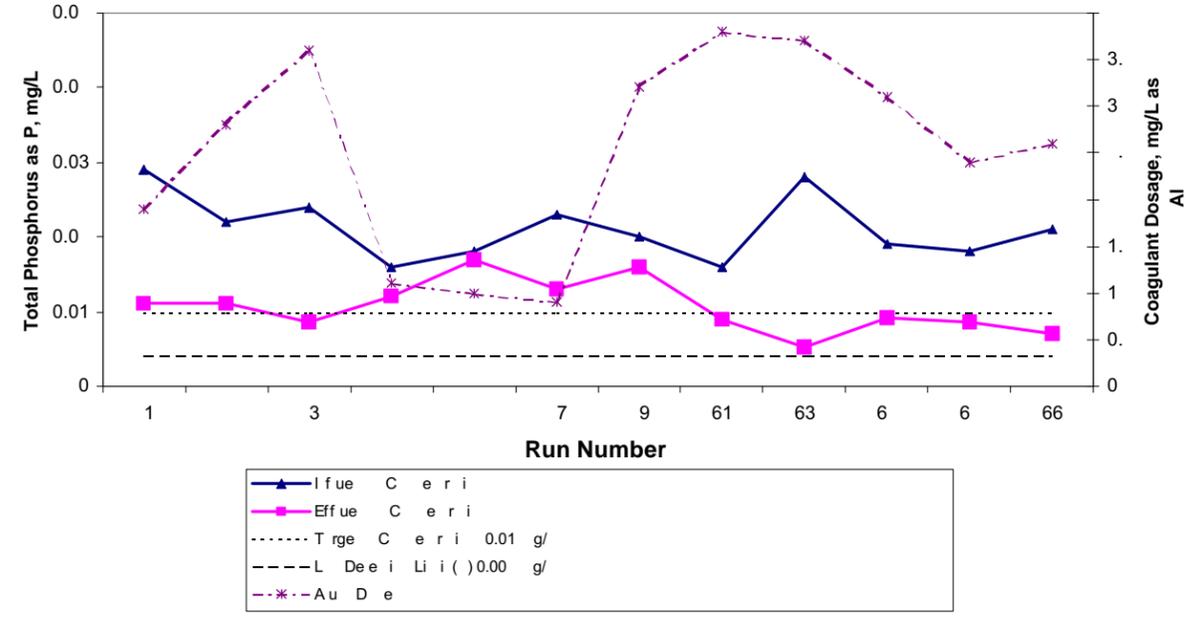
figure 4.1

MEMCOR FEED AND FILTRATE  
TOTAL PHOSPHORUS CONCENTRATION  
G-250 LOCATION

(A) MICROFILTRATION COUPLED WITH FeCl<sub>3</sub> COAGULANT ADDITION



(B) MICROFILTRATION COUPLED WITH ALUM COAGULANT ADDITION



(C) MICROFILTRATION USING NO COAGULANT

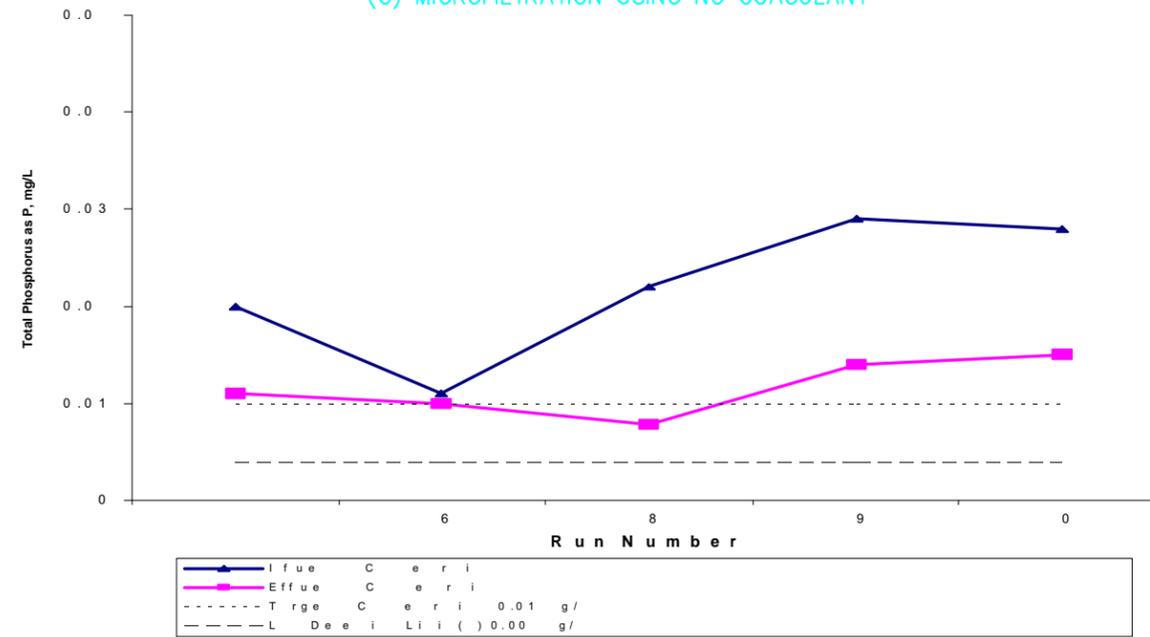
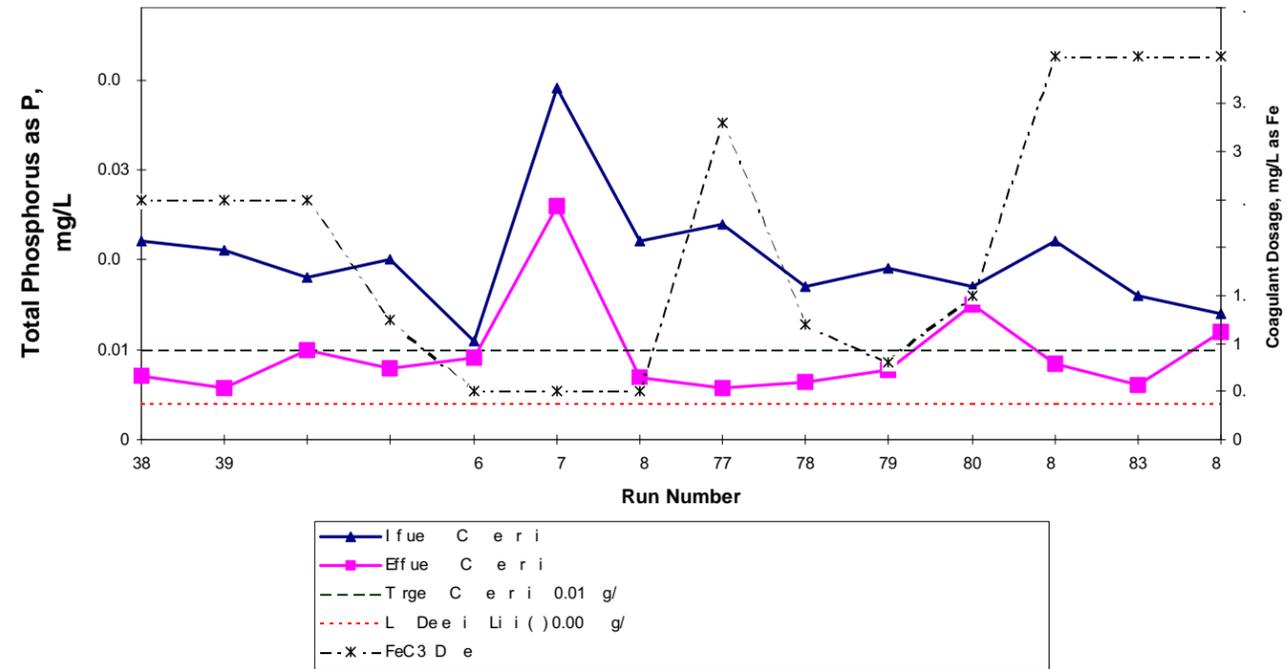
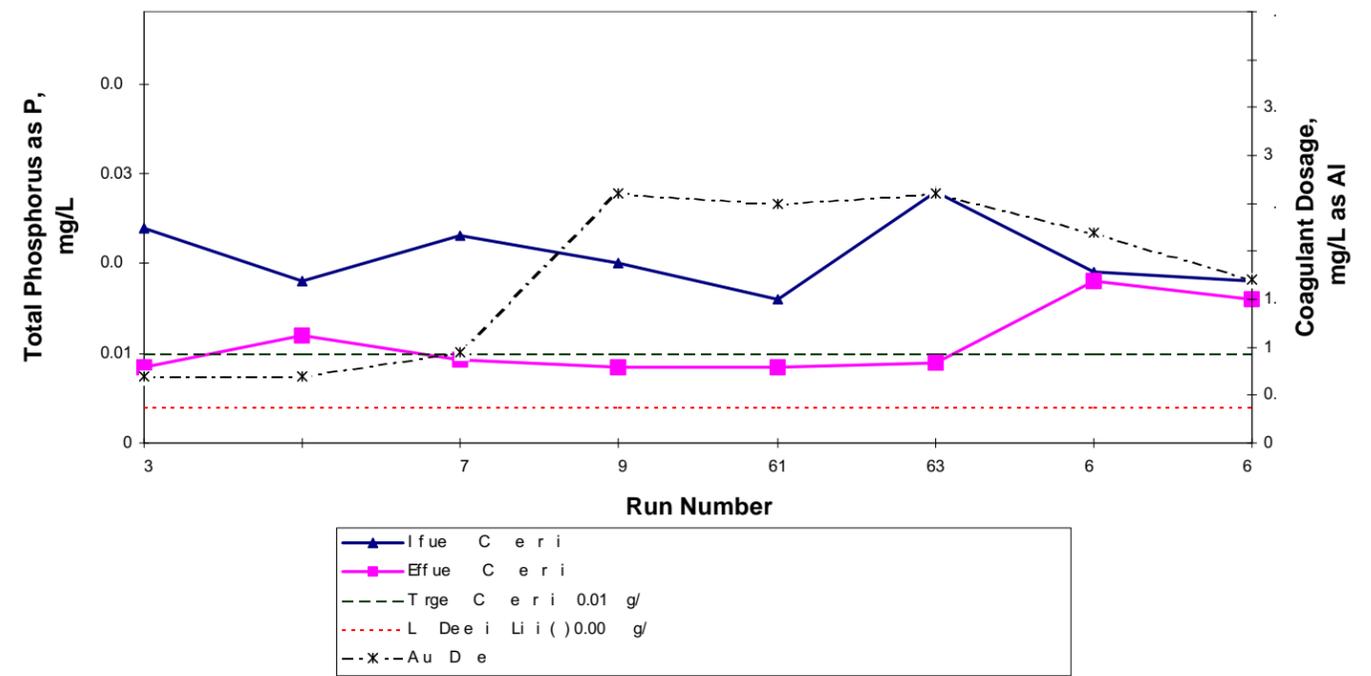


figure 4.2  
MEMCOR FEED AND FILTRATE  
TOTAL PHOSPHORUS CONCENTRATION  
G-251 LOCATION

(A) MICROFILTRATION COUPLED WITH  $FeCl_3$  COAGULANT ADDITION



(B) MICROFILTRATION COUPLED WITH ALUM COAGULANT ADDITION



(C) MICROFILTRATION USING NO COAGULANT

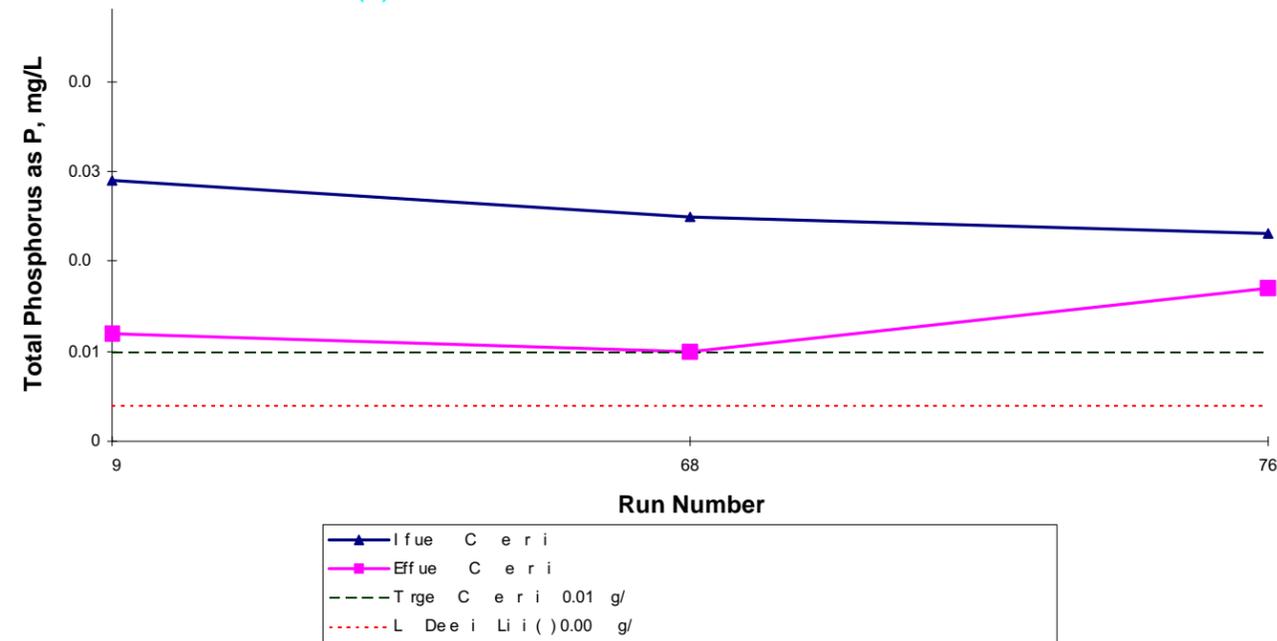
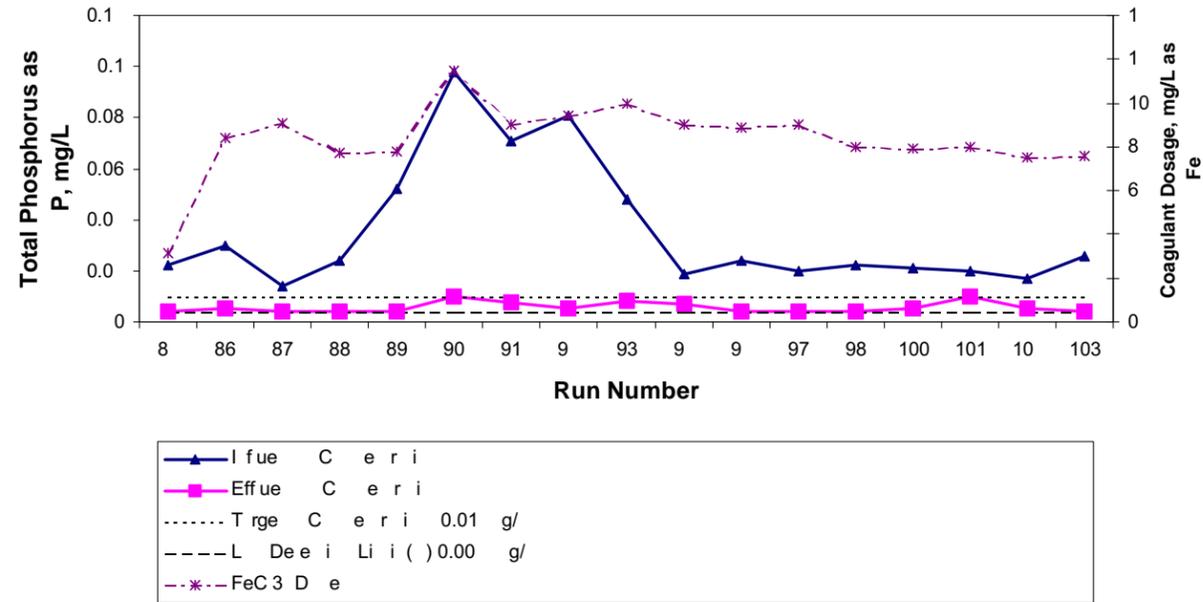
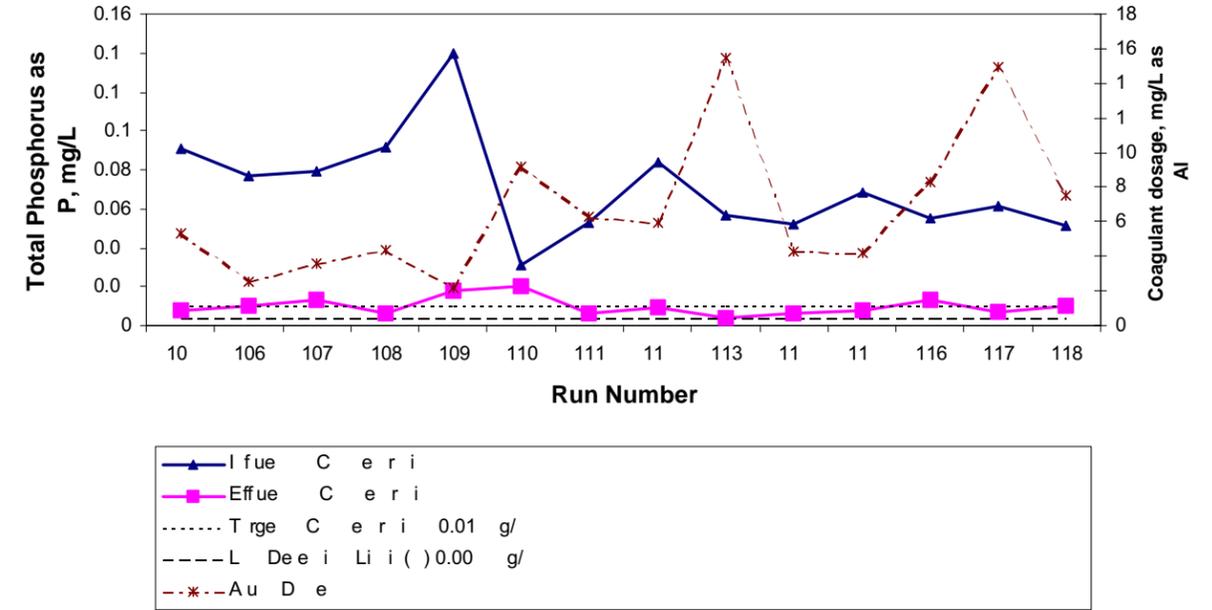


figure 4.3  
ZENON FEED AND FILTRATE  
TOTAL PHOSPHORUS CONCENTRATION  
G-251 LOCATION

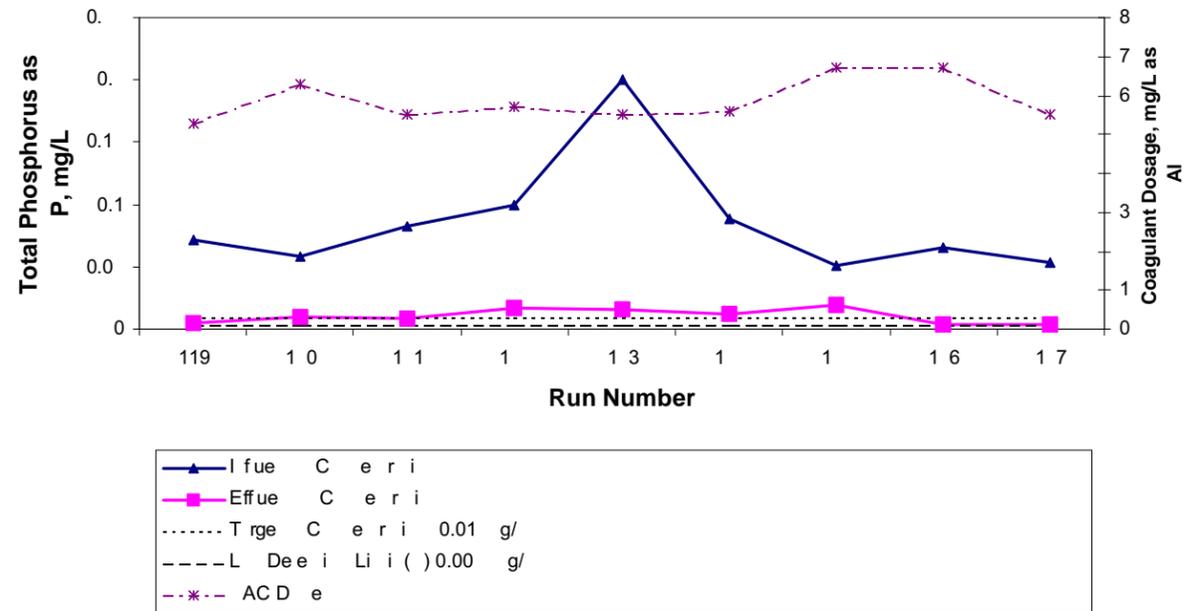
(A) MICROFILTRATION COUPLED WITH FeCl<sub>3</sub> COAGULANT ADDITION



(B) MICROFILTRATION COUPLED WITH ALUM COAGULANT ADDITION



(C) MICROFILTRATION COUPLED WITH POLYALUMINUM CHLORIDE (PAC) ADDITION



(D) MICROFILTRATION USING NO COAGULANT

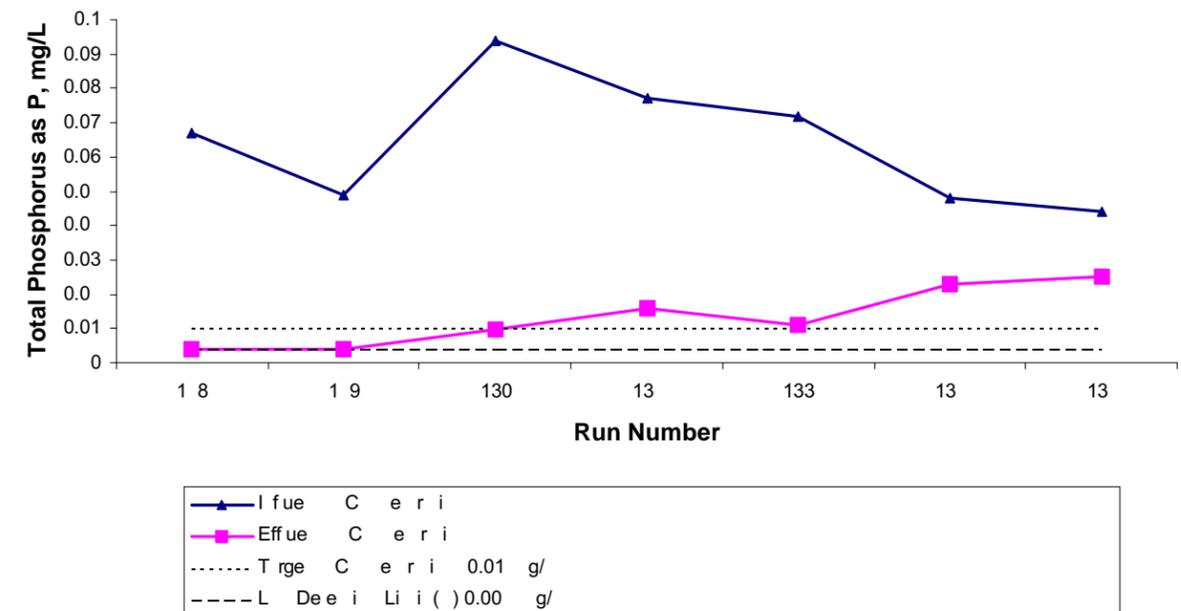
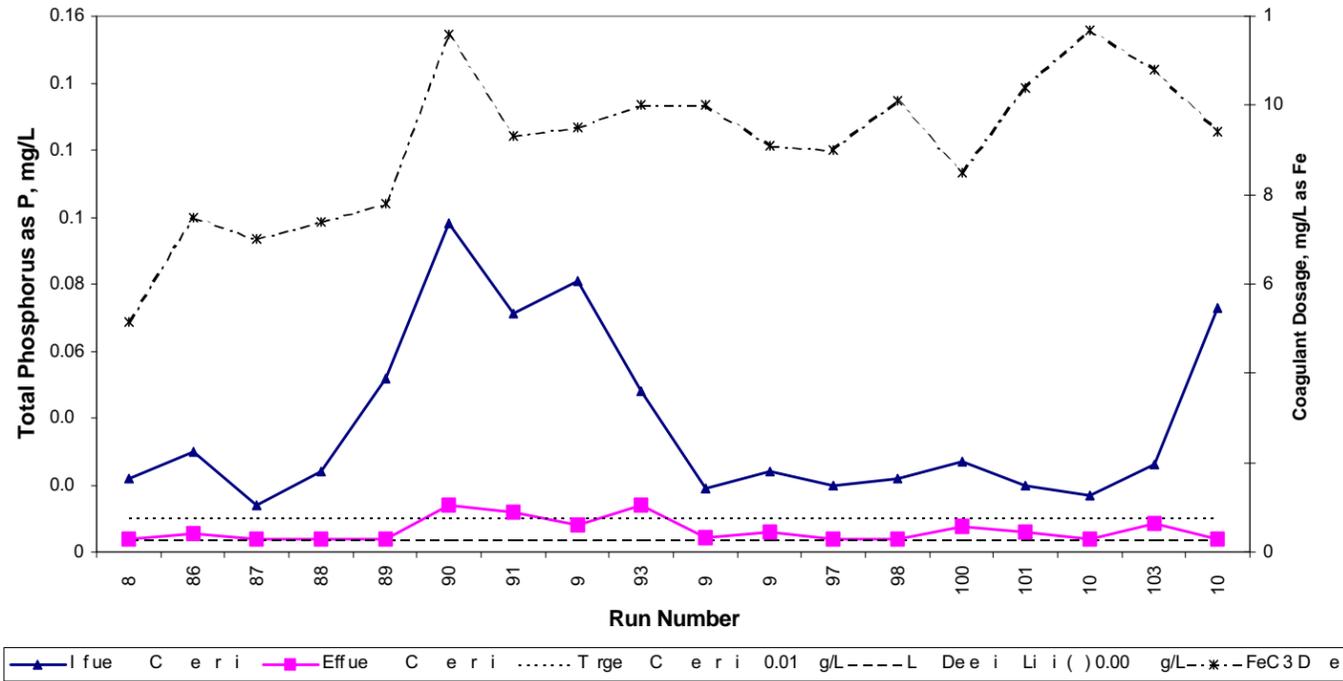
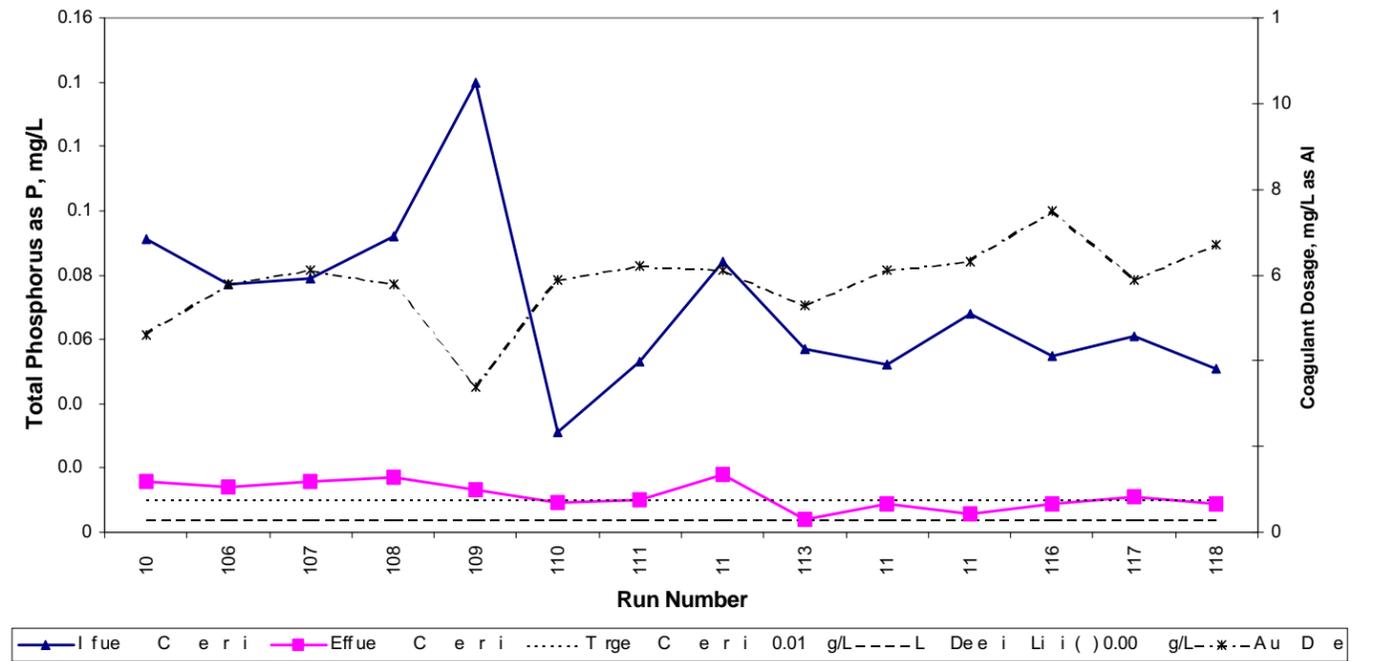


figure 4.4  
MEMCOR FEED AND FILTRATE  
TOTAL PHOSPHORUS CONCENTRATION  
G-250 LOCATION

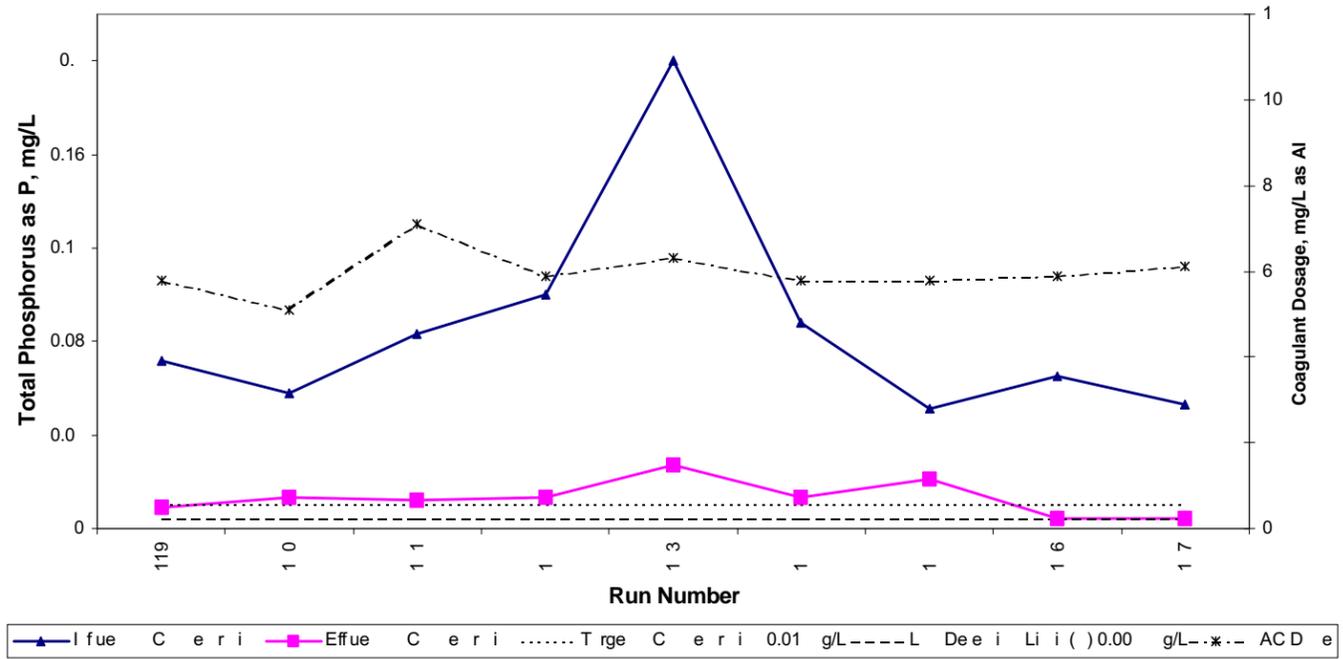
(A) MICROFILTRATION COUPLED WITH FeCl<sub>3</sub> COAGULANT ADDITION



(B) MICROFILTRATION COUPLED WITH ALUM COAGULANT ADDITION



(C) MICROFILTRATION COUPLED WITH POLYALUMINUM CHLORIDE (PAC) ADDITION



(D) MICROFILTRATION USING NO COAGULANT

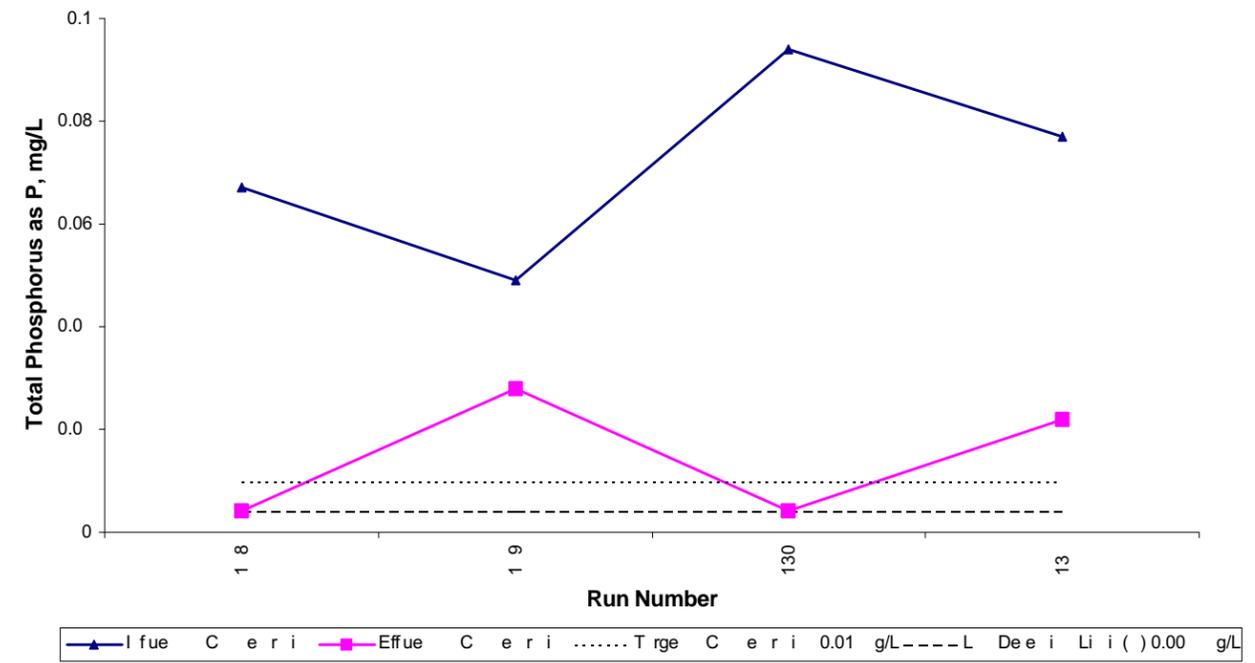


figure 4.5  
ZENON FEED AND FILTRATE  
TOTAL PHOSPHORUS CONCENTRATION  
G-250 LOCATION

tracking relationship between influent and filtrate total P results. As the influent phosphorus concentration changes, the filtered effluent phosphorus generally changes proportionately. Microfiltration alone removes a significant amount of total phosphorus, however, enhanced phosphorus removal occurs when microfiltration is coupled with chemical coagulation as described below:

Figure 4.1b shows the results of ferric chloride coagulant addition at the ENR influent (G-250) station. Ferric chloride doses of between 5 and 10 mg/L as Fe (runs 26 through 29) were sufficient to reduce the total P in the filtrate to <0.006 mg/L as P. The only point on Figure 4.1b yielding an elevated filtrate total P occurred during run number 30. A spike total P feed concentration of 0.09 mg/L as P during this run produced a filtrate value of 0.017 mg/L as P. The ferric chloride dose of 2.6 mg/L as Fe was not sufficient to reduce the 0.09 mg/L of phosphorus to less than 0.01 mg/L as P in the filtrate.

Figure 4.2a provides the results of ferric chloride coagulant addition for the Memcor unit while operating at the G-251 (ENR effluent) station. As shown in runs 79 through 84, ferric chloride doses ranging from 3 to 6 mg/L as Fe was sufficient to consistently produce an MF filtrate containing less than 0.01 mg/L as P. While using Alum as the coagulant at this same location, Figure 4.2b shows that dosages of between 0.5 to 1.5 mg/L as Al (see runs 54 to 57) were insufficient to produce a filtrate of less than 0.01 mg/L as P. When the alum dose was increased to between 2 to 4 mg/L as Al as shown in runs 63 through 66, a filtrate containing less than 0.01 mg/L as P was consistently achieved.

Figure 4.3a also shows that while using ferric chloride as a coagulant at concentrations of less than 1 mg/L as Fe, the filtrate total P concentration increase to greater than 0.01 mg/L as P (see runs 47 and 80). As shown in runs 38 through 42, ferric chloride doses of between 2.5 to 3 mg/L coupled with microfiltration consistently produces a filtrate of less than 0.01 mg/L as P on ENR effluent waters.

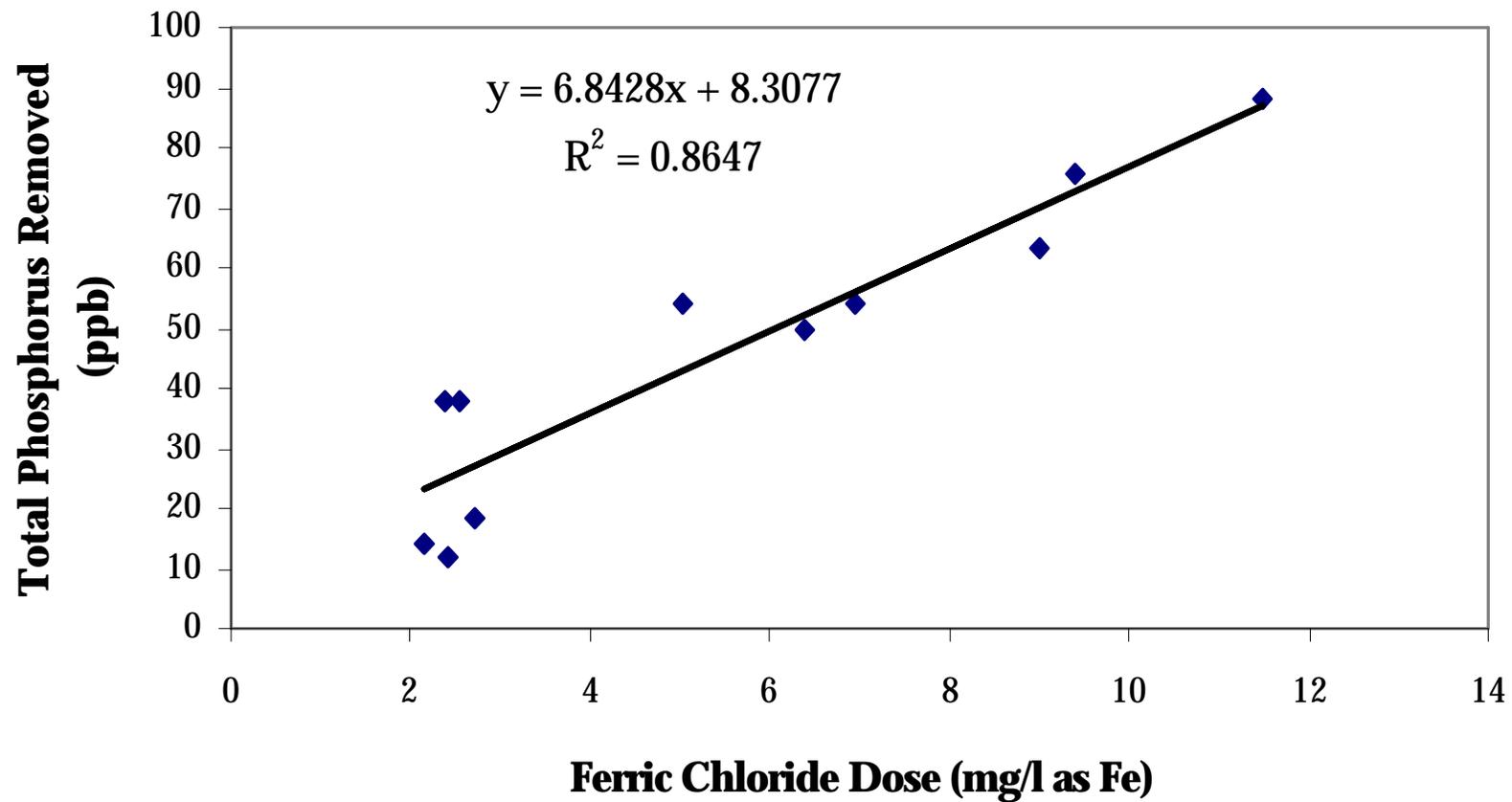
Figure 4.4a graphically provides the results of ferric chloride coagulant addition with the Memcor MF unit while the field trailer was located at the ENR influent location (G-250). As shown in runs 86 through 103, ferric chloride doses ranging from roughly 7.5 to 10 mg/L as Fe, consistently produced an MF filtrate of less than 0.01 mg/L as P. These results were obtained while the influent feed total P concentration varied from 0.015 mg/L to 0.098 mg/L as P.

Figure 4.5a shows the Zenon unit MF results while using ferric chloride as a coagulant at the ENR influent (G-250) station. Coagulant feed concentrations of between 7.5 to 12 mg/L ferric chloride as Fe (see runs 92 through 104) consistently produced MF filtrate total P results of less than 0.01 mg/L as P. During run 90, a spike in the influent total phosphorus concentration of 0.098 mg/L as P resulted in a filtrate value of 0.014 mg/L as P, which is higher than the current interim threshold value of 0.01 mg/L. The elevated filtrate value of 0.014 mg/L as P was generated during a period that a ferric chloride dose of 11.6 mg/L as Fe was being fed to the Zenon Pilot Unit. This spike phosphorus concentration observed in run 90 in the influent feed demonstrates the need for real time total phosphorus analysis to be incorporated into any full-scale treatment application. Periodic analysis of total phosphorus throughout the day in a full-scale treatment system would enable more exact tracking of coagulant dose with respect to phosphorus influent and effluent levels and would:

- Reduce the chance of exceeding a promulgated maximum discharge criteria for total phosphorus during peak influent flow/phosphorus concentration periods; and
- Reduce the amount of coagulant being fed because real time analyses would reduce the need to add an excess coagulant quantity to ensure compliance with discharge criteria. If real time phosphorus monitoring could reduce the coagulant feed requirement by 1 mg/L, a total of 1,668 pounds of coagulant would be conserved every day for a 200 million-gallon per day capacity full-scale treatment system.

#### **4.6 COAGULANT DOSAGE IN RELATION TO PHOSPHORUS REMOVAL RATES**

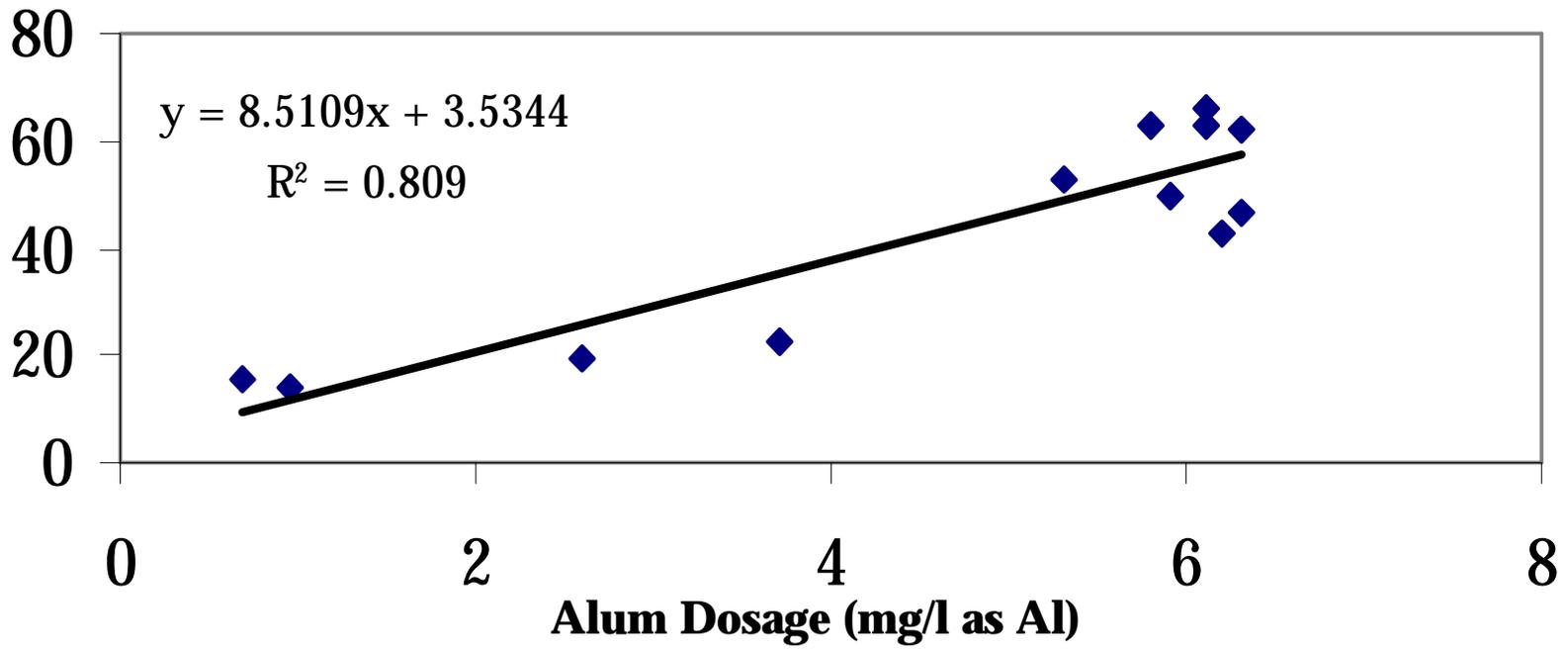
In order to quantify the phosphorus removal rates in relation to coagulant dose, the MF study data base was reviewed and screened for data points yielding the lowest Alum and Ferric Chloride dosages that removed the greatest amount of total phosphorus. The screening of the data base was accomplished by eliminating the higher of two given coagulant doses that removed the same amount of total phosphorus. A plot of the remaining data points was developed showing the phosphorus removed (Feed minus permeate total P concentration) versus the minimum coagulant dose required. Figure 4.6 provides the resulting graph for Ferric Chloride and Figure 4.7 shows a similar plot, when using Alum as the coagulant. Both plots show fairly good linear relationships between total P removal rates and coagulant dosage with linear correlation coefficients being greater than 80 percent for both graphs. Using the equations shown Figures 4.6 and 4.7, respectively, a comparison of phosphorus removal rates for select alum and ferric chloride dosage rates is provided below:



NOTE: SELECT DATA POINTS WERE CHOSEN TO DEVELOP THIS GRAPH (SEE TEXT)

figure 4.6  
PHOSPHORUS REMOVAL  
VERSUS FERRIC CHLORIDE DOSE

**Total Phosphorus Removed  
(ppb as P)**



NOTE: SELECT DATA POINTS WERE CHOSEN TO DEVELOP THIS GRAPH (SEE TEXT)

figure 4.7  
PHOSPHORUS REMOVAL  
VERSUS ALUM DOSE

<b>Coagulant Dose (mg/L)</b>	<b>P Removal with Alum (ng/L)</b>	<b>P Removal with Ferric Chloride (ng/L)</b>
1	12	15
3	29	29
7	63	56
10	89	76

It is important to point out these relationships will apply over the range of phosphorus levels observed in the study (i.e., 0.02 to 0.12 mg/L) and extrapolation outside of this range is not recommended.

The dosage/response curves for alum and ferric chloride are somewhat similar but they do indicate that alum may be slightly more effective at the higher P removal levels.

Traditionally, phosphorus removal using aluminum and iron salts have been related to tertiary treatment of domestic and industrial wastewaters and reducing total phosphorus concentrations to a range of 0.5 to 1 mg/L as P. As shown below using the MF data, reducing phosphorus concentrations to 0.01 mg/L requires a much higher mole ratio (30 to 85 times higher) of coagulant to phosphorus:

	<b><u>Moles of Alum added (as Al)</u> Moles of Phosphorus Removed</b>	<b><u>Moles of FeCl<sub>3</sub> added(as Fe)</u> Moles of Phosphorus Removed</b>
Residual Phosphorus Level of 1 mg/L	1.6 - 2.6 <sup>1</sup>	1.8 2.2 <sup>1</sup>
Residual Phosphorus Level of 0.01 mg/L	125 <sup>2</sup>	60 <sup>2</sup>

<sup>1</sup> Source: *Wastewater Engineering*, Metcalf & Eddy, Inc., 1972

<sup>2</sup> Based upon MF Study results using a 7 mg/L coagulant dose and a removal of 0.06 mg of phosphorus as P.

## **4.7            ADDITIONAL MICROFILTRATION STUDY ANALYTICAL RESULTS**

In addition to phosphorus testing, a suite of additional organic and inorganic parameters were periodically analyzed on pilot unit feed, permeate and solids samples. Analytical information on these additional parameters were obtained in order to:

- Obtain required data for developing process design information for a full-scale application;
- Determine if the microfiltration process introduces any chemical constituents that may be harmful or toxic to downstream bodies of water;
- Determine if the MF process removes any chemical constituents that may be beneficial or essential to the flora and fauna contained in receiving streams; and
- Determine if there are any toxic or hazardous constituents associated with the solids generated by the microfiltration process.

### **4.7.1        ADDITIONAL ANALYTICAL RESULTS FOR THE G – 250, ENR INFLUENT, LOCATION**

Table 4.5 provides a summary of the analyses performed on the feed and Memcor and Zenon filtrate samples while the field trailer was stationed at the ENR influent location. Provided in Table 4.5 are the mean, maximum, minimum, standard deviation, and analysis of variance for the various analytical parameters. The analysis of variance compared the feed concentrations versus the respective Zenon and Memcor filtrate concentrations to determine if there were any statistical differences in the feed/filtrate populations at the 95 percent confidence interval.

#### **Total Suspended Solids (TSS)**

The average total suspended solids concentration on feed samples at the ENR influent was equal to 5.0 mg/L. This average value is exactly equal to the laboratory's method detection limit (MDL) of 5.0 mg/L for TSS and clearly indicates that there were no appreciable amounts of suspended solids in the incoming waters to the ENR project. The TSS results for the Memcor and Zenon filtrates were less than the lab's MDL of 5.0 mg/L.

**TABLE 4.5  
OTHER PARAMETER RESULTS FOR  
G-250 LOCATION WHILE FEEDING COAGULANT**

	<b>FEED</b>	<b>MEMCOR EFFLUENT</b>	<b>ZENON EFFLUENT</b>
<b><u>Total Suspended Solids, mg/L (MDL = 5.0 mg/L)</u></b>			
Mean	5.04	3.06	4.63
Max	11.00	8.50	28.00
Min	2.50	2.50	2.50
N	41	41	26
S.D.	2.94	1.44	5.11
Stat.Diff.	---	Yes	No
<b><u>Total Solids, mg/L (MDL = 5.0 mg/L)</u></b>			
Mean	905	902	891
Max	1000	1000	990
Min	740	750	750
N	26	26	26
S.D.	66	65	59
Stat.Diff.	---	No	No
<b><u>Total Organic Carbon, mg/L (MDL = 1.0 mg/L)</u></b>			
Mean	42.2	36.1	40.8
Max	62.0	58.0	61.0
Min	26.0	21.0	33.0
N	32	35	30
S.D.	9.0	8.7	8.2
Stat.Diff.	---	Yes	No
<b><u>Color, PCU (MDL = 5.0 PCU)</u></b>			
Mean	213	154	189
Max	500	400	400
Min	75	30	100
N	24	28	20
S.D.	105	78	77
Stat.Diff.	---	No	No
<b><u>Alkalinity, mg/L (MDL = 1.0 mg/L)</u></b>			
Mean	323	314	310
Max	400	390	380
Min	1	200	260
N	21	25	20
S.D.	81	43	26
Stat.Diff.	---	No	No
<b><u>Total Dissolved Solids, mg/L (MDL = 5.0 mg/L)</u></b>			
Mean	812	803	842
Max	980	1000	940
Min	380	420	670
N	30	34	25
S.D.	151	152	58
Stat.Diff.	---	No	No
<b><u>Total Kjeldahl Nitrogen, mg/L (MDL = 0.2 mg/L)</u></b>			
Mean	2.81	2.34	2.62
Max	4.00	3.50	3.30
Min	1.70	1.10	2.20
N	10	10	5
S.D.	0.75	0.79	0.43
Stat.Diff.	---	No	No

**TABLE 4.5  
OTHER PARAMETER RESULTS FOR  
G-250 LOCATION WHILE FEEDING COAGULANT**

	<b>FEED</b>	<b>MEMCOR EFFLUENT</b>	<b>ZENON EFFLUENT</b>
<b><u>Ammonia, mg/L (MDL = 0.03 mg/L)</u></b>			
Mean	0.731	0.715	0.598
Max	1.100	1.200	0.890
Min	0.110	0.110	0.320
N	10	10	5
S.D.	0.336	0.374	0.250
Stat.Diff.	---	No	No
<b><u>Nitrate/Nitrite, mg/L (MDL = 0.05 mg/L)</u></b>			
Mean	0.207	0.213	0.406
Max	0.700	0.740	0.900
Min	0.025	0.025	0.025
N	10	10	5
S.D.	0.243	0.256	0.416
Stat.Diff.	---	No	No
<b><u>Reactive Silica, mg/L (MDL = 2.0 mg/L)</u></b>			
Mean	23.2	22.4	20.0
Max	45.0	39.0	30.0
Min	8.0	10.0	13.0
N	12	13	9
S.D.	11.4	8.4	5.7
Stat.Diff.	---	No	No
<b><u>Sodium, mg/L (MDL = 0.5 mg/L)</u></b>			
Mean	144	134	143
Max	180	170	160
Min	91	76	120
N	10	11	9
S.D.	30	31	14
Stat.Diff.	---	No	No
<b><u>Zinc, mg/L (MDL = 0.02 mg/L)</u></b>			
Mean	0.012	0.011	0.010
Max	0.025	0.023	0.010
Min	0.010	0.010	0.010
N	9	9	9
S.D.	0.005	0.004	0.000
Stat.Diff.	---	No	No
<b><u>Calcium, mg/L (MDL = 0.5 mg/L)</u></b>			
Mean	89.0	84.1	90.2
Max	120.0	120.0	120.0
Min	70.0	55.0	71.0
N	10	11	9
S.D.	16.0	18.3	18.0
Stat.Diff.	---	No	No
<b><u>Copper, mg/L (MDL = 0.025 mg/L)</u></b>			
Mean	0.013	0.013	0.013
Max	0.013	0.013	0.013
Min	0.013	0.013	0.013
N	9	9	9
S.D.	0.000	0.000	0.000
Stat.Diff.	---	No	No

**TABLE 4.5**  
**OTHER PARAMETER RESULTS FOR**  
**G-250 LOCATION WHILE FEEDING COAGULANT**

	<b>FEED</b>	<b>MEMCOR EFFLUENT</b>	<b>ZENON EFFLUENT</b>
<b><u>Magnesium, mg/L (MDL = 0.5 mg/L)</u></b>			
Mean	27.1	25.6	28.0
Max	36.0	37.0	40.0
Min	22.0	17.0	22.0
N	10	11	9
S.D.	4.2	5.2	5.1
Stat.Diff.	---	No	No
<b><u>Manganese, mg/L (MDL = 0.01 mg/L)</u></b>			
Mean	0.009	0.021	0.012
Max	0.016	0.059	0.023
Min	0.005	0.005	0.005
N	10	11	9
S.D.	0.005	0.017	0.008
Stat.Diff.	---	Yes	No
<b><u>Mercury, mg/L (MDL = 0.0002 mg/L)</u></b>			
Mean	0.0001	0.0001	0.0001
Max	0.0001	0.0001	0.0001
Min	0.0001	0.0001	0.0001
N	9	9	9
S.D.	0.0000	0.0000	0.0000
Stat.Diff.	---	No	No
<b><u>Molybdenum, mg/L (MDL = 0.01 mg/L)</u></b>			
Mean	0.005	0.005	0.005
Max	0.005	0.005	0.005
Min	0.005	0.005	0.005
N	10	11	9
S.D.	0.000	0.000	0.000
Stat.Diff.	---	No	No
<b><u>Potassium, mg/L (MDL = 1.0 mg/L)</u></b>			
Mean	9.23	8.72	9.28
Max	11.00	10.00	10.00
Min	8.20	6.30	8.20
N	10	11	9
S.D.	0.81	0.95	0.64
Stat.Diff.	---	No	No
<b><u>Ametryn, mg/L (MDL = 2.0 ug/L)</u></b>			
Mean	0.001	0.001	0.001
Max	0.001	0.001	0.001
Min	0.001	0.001	0.001
N	4	4	4
S.D.	0.000	0.000	0.000
Stat.Diff.	---	No	No
<b><u>Atrazine, mg/L (MDL = 2.0 ug/L)</u></b>			
Mean	0.001	0.001	0.001
Max	0.001	0.001	0.001
Min	0.001	0.001	0.001
N	4	4	4
S.D.	0.000	0.000	0.000
Stat.Diff.	---	No	No

**TABLE 4.5  
OTHER PARAMETER RESULTS FOR  
G-250 LOCATION WHILE FEEDING COAGULANT**

<b>2,4-D, mg/L (MDL = 0.5 ug/L)</b>	<b>FEED</b>	<b>MEMCOR EFFLUENT</b>	<b>ZENON EFFLUENT</b>
<b>Mean</b>	0.0003	0.0003	0.0003
<b>Max</b>	0.0003	0.0003	0.0003
<b>Min</b>	0.0003	0.0003	0.0003
<b>N</b>	4	4	4
<b>S.D.</b>	0.0000	0.0000	0.0000
<b>Stat.Diff.</b>	---	No	No

Notes:

- (1) For values less than stated lab reporting limit, 0.5 of reporting limit used to compute mean
- (2) Stat. Diff. = Analysis of variance at 95% confidence interval
- (3) N = Number of samples
- (4) S.D. = Standard Deviation

### Total Solids (TS)

The mean total solids concentration on the feed samples was equal to 905 mg/L. Mean concentration of TS for the Memcor filtrate analyses was equal to 902 mg/L and 891 mg/L for the Zenon filtrate. There was no statistical difference between the TS in the feed compared to the respective Memcor and Zenon filtrates.

### Total Organic Carbon and Color

The total organic carbon content of the surface waters is primarily attributed to the dissolved lignins and tanins derived from the organic muck soils. The mean feed TOC concentration of 42.2 mg/L was slightly higher than the average concentration observed in the Memcor filtrate of 36.1 mg/L and very close to the Zenon average of 40.8 mg/L. The feed to Memcor filtrate TOC was determined to be statistically different but the feed to the Zenon filtrate was not.

The color content of the feed waters averaged 213 Platinum Cobalt Units (PCUs) and the Memcor and Zenon filtrates averaged 154 and 189 PCUs respectively. There was no significant difference between the feed and respective filtrate concentrations for color.

Based upon the analytical data collected during the field investigations, the microfiltration process had no appreciable impact on the amounts of color and TOC found in the ENR feed waters.

### Total Alkalinity

The mean total alkalinity in the ENR feed waters was equal to 323 mg/L as CaCO<sub>3</sub>. The Memcor filtrate samples averaged 314 mg/L as CaCO<sub>3</sub> Zenon filtrate averaged 310 mg/L as CaCO<sub>3</sub>. There was no statistical difference between the feed and Memcor filtrate alkalinity data. The feed data compared to the Zenon filtrate alkalinity data showed no significant difference either. No observed alterations in total alkalinity were observed as the result of the microfiltration process.

### Total Dissolved Solids

The mean total dissolved solids concentration of the ENR feed samples equaled 812 mg/L. The Memcor and the Zenon filtrate samples averaged 803 and 842 mg/L TDS, respectively. There was no statistically significant difference between the feed sample TDS population compared to both Zenon and the Memcor filtrate TDS data

points. No alteration of the native TDS was observed as the result of microfiltration process.

### Nitrogen Series Analyses

Periodic analyses were obtained from the feed and the Memcor and Zenon filtrates for the nitrogen series components of total kjeldahl nitrogen (TKN), ammonia, and nitrate plus nitrite. Collectively, the sum of TKN and nitrate plus nitrite are equal to the total nitrogen content. As shown in Table 4.5, there were no significant statistical differences between any of the nitrogen forms when comparing the feed data set to the Memcor and Zenon filtrate results.

### Metals Analyses

Table 4.5 provides the results of the analyses performed on ENR influent feed samples and Zenon and Memcor filtrate samples for the metals including Calcium, Copper, Zinc, Sodium, Magnesium, standard Mercury, Molybdenum and Potassium. As shown in Table 4.5, there were no significant differences between the influent results of all of these metals when compared the respective Memcor and Zenon filtrate data.

Manganese was the only metal displaying a significant difference between the feed and the Memcor filtrate data. The mean feed concentration for Manganese was equal to 0.009 mg/L with the Memcor filtrate recording an average value of 0.021 mg/L. The source of this increase for Manganese in the Memcor filtrate is unknown; however, the levels are relatively low and there was no statistical difference between the feed and the Zenon filtrate data.

### Reactive Silica

The ENR influent contained an average of 23.2 mg/L of reactive silica. The Memcor filtrate averaged 22.4 mg/L and the Zenon filtrate recorded an average of 20.0 mg/L of reactive silica. The results of the analysis of variance indicated there was no statistical difference observed between the influent and the Memcor and Zenon filtrates with respect to reactive silica. The microfiltration process has no observed effect on the native content of reactive silica.

## Herbicide Analyses

The herbicides ametryn, atrazine, and 2,4-D were analyzed a total of 4 times on ENR influent and Memcor and Zenon filtrate samples. As shown in Table 4.5, all analytical results were reported below the laboratory method detection limits. The MDLs for ametryn and atrazine were equal to 2 micrograms per liter and for 2,4-D, the laboratory MDL was 5 micrograms per liter.

### **4.7.2      ADDITIONAL ANALYTICAL RESULTS FOR THE G-251, ENR EFFLUENT, LOCATION**

Table 4.6 provides a summary of the analyses performed on the Pilot Unit feed and Memcor and Zenon filtrate samples while the field trailer was stationed at the ENR effluent (G-251) location. Assessments of individual parameters results is provided below:

#### Solids Analyses

As shown in Table 4.6, TSS average results for the feed samples and the Memcor and Zenon filtrate samples were all less than the laboratory's MDL of 5.0 mg/L.

The average TS value for feed samples was equal to 573 mg/L. The Memcor filtrate average results was equal to 558 mg/L TS and the Zenon filtrate averaged 550 mg/L TS. The analysis of variance indicated that there was a significant difference between the feed and the Zenon filtrate, but no difference between the feed and the Memcor filtrate. Since the average feed TS and the filtrate values for both the Zenon and Memcor were all within 5 percent of each other, the difference noted by the variance analysis is not considered significant.

TDS average results for the feed samples versus the filtrates were similar as shown below:

	<b><i>Feed</i></b>	<b><i>Zenon Filtrate</i></b>	<b><i>Memcor Filtrate</i></b>
Average TDS, mg/L	544	545	524

In addition, there was no statistically significant difference between the TDS feed and the respective Memcor and Zenon data sets.

**TABLE 46  
OTHER PARAMETER RESULTS FOR  
G-251 LOCATION WHILE FEEDING COAGULANT**

	<b>FEED</b>	<b>MEMCOR EFFLUENT</b>	<b>ZENON EFFLUENT</b>
<b><u>Total Suspended Solids, mg/L (MDL = 5.0 mg/L)</u></b>			
Mean	3.42	2.87	2.86
Max	7.00	7.00	5.00
Min	2.50	2.50	2.50
N	19	19	14
S.D.	1.63	1.15	0.91
Stat.Diff.	---	No	No
<b><u>Total Solids, mg/L (MDL = 5.0 mg/L)</u></b>			
Mean	573	558	550
Max	590	600	560
Min	560	520	540
N	4	4	4
S.D.	15	35	8
Stat.Diff.	---	No	Yes
<b><u>Total Organic Carbon, mg/L (MDL = 1.0 mg/L)</u></b>			
Mean	34.5	31.3	33.8
Max	38.0	37.0	39.0
Min	30.0	28.0	29.0
N	20	22	16
S.D.	2.1	2.2	2.8
Stat.Diff.	---	No	No
<b><u>Color, PCU (MDL = 5.0 PCU)</u></b>			
Mean	179	167	174
Max	250	250	250
Min	150	100	125
N	16	19	12
S.D.	26	30	30
Stat.Diff.	---	No	No
<b><u>Alkalinity, mg/L (MDL = 1.0 mg/L)</u></b>			
Mean	179	178	170
Max	220	220	200
Min	130	160	140
N	16	19	12
S.D.	23	18	17
Stat.Diff.	---	No	No
<b><u>Total Dissolved Solids, mg/L (MDL = 5.0 mg/L)</u></b>			
Mean	544	545	524
Max	650	640	610
Min	300	320	420
N	16	19	12
S.D.	84	79	68
Stat.Diff.	---	No	No
<b><u>Total Kjeldahl Nitrogen, mg/L (MDL = 0.2 mg/L)</u></b>			
Mean	2.17	1.88	1.83
Max	2.30	2.00	2.00
Min	1.90	1.60	1.50
N	3	4	3
S.D.	0.23	0.19	0.29
Stat.Diff.	---	---	---

**TABLE 4.6  
OTHER PARAMETER RESULTS FOR  
G-251 LOCATION WHILE FEEDING COAGULANT**

	<b>FEED</b>	<b>MEMCOR EFFLUENT</b>	<b>ZENON EFFLUENT</b>
<b><u>Ammonia, mg/L (MDL = 0.03 mg/L)</u></b>			
Mean	0.066	0.075	0.050
Max	0.095	0.098	0.074
Min	0.015	0.015	0.015
N	4	4	3
S.D.	0.035	0.040	0.031
Stat.Diff.	---	---	---
<b><u>Nitrate/Nitrite, mg/L (MDL = 0.05 mg/L)</u></b>			
Mean	0.025	0.032	0.025
Max	0.025	0.053	0.025
Min	0.025	0.025	0.025
N	3	4	3
S.D.	0.000	0.014	0.000
Stat.Diff.	---	---	---
<b><u>Reactive Silica, mg/L (MDL = 2.0 mg/L)</u></b>			
Mean	16.4	16.7	14.4
Max	19.0	20.0	16.9
Min	13.0	13.0	11.0
N	5	6	5
S.D.	2.4	2.4	2.4
Stat.Diff.	---	No	No
<b><u>Sodium, mg/L (MDL = 0.5 mg/L)</u></b>			
Mean	102	113	108
Max	110	130	120
Min	99	100	98
N	4	6	5
S.D.	5	12	9
Stat.Diff.	---	No	No
<b><u>Zinc, mg/L (MDL = 0.02 mg/L)</u></b>			
Mean	0.010	0.014	0.010
Max	0.010	0.033	0.010
Min	0.010	0.010	0.010
N	4	6	5
S.D.	0.000	0.009	0.000
Stat.Diff.	---	No	No
<b><u>Calcium, mg/L (MDL = 0.5 mg/L)</u></b>			
Mean	44.0	49.7	44.2
Max	50.0	56.0	50.0
Min	40.0	43.0	41.0
N	4	6	5
S.D.	4.2	5.9	3.8
Stat.Diff.	---	No	No
<b><u>Copper, mg/L (MDL = 0.025 mg/L)</u></b>			
Mean	0.013	0.013	0.013
Max	0.013	0.013	0.013
Min	0.013	0.013	0.013
N	2	2	2
S.D.	0.000	0.000	0.000
Stat.Diff.	---	---	---

**TABLE 4.6  
OTHER PARAMETER RESULTS FOR  
G-251 LOCATION WHILE FEEDING COAGULANT**

	<b>FEED</b>	<b>MEMCOR EFFLUENT</b>	<b>ZENON EFFLUENT</b>
<b><u>Magnesium, mg/L (MDL = 0.5 mg/L)</u></b>			
Mean	19.8	21.3	20.4
Max	20.0	25.0	22.0
Min	19.0	19.0	19.0
N	4	6	5
S.D.	0.5	2.1	1.1
Stat.Diff.	---	No	No
<b><u>Manganese, mg/L (MDL = 0.01 mg/L)</u></b>			
Mean	0.010	0.007	0.005
Max	0.019	0.014	0.005
Min	0.005	0.005	0.005
N	4	6	5
S.D.	0.007	0.004	0.000
Stat.Diff.	---	No	No
<b><u>Mercury, mg/L (MDL = 0.0002 mg/L)</u></b>			
Mean	0.0001	0.0001	0.0003
Max	0.0001	0.0001	0.0010
Min	0.0001	0.0001	0.0001
N	4	4	4
S.D.	0.0000	0.0000	0.0005
Stat.Diff.	---	No	No
<b><u>Molybdenum, mg/L (MDL = 0.01 mg/L)</u></b>			
Mean	0.005	0.005	0.005
Max	0.005	0.005	0.005
Min	0.005	0.005	0.005
N	4	6	5
S.D.	0.000	0.000	0.000
Stat.Diff.	---	No	No
<b><u>Potassium, mg/L (MDL = 1.0 mg/L)</u></b>			
Mean	6.60	7.42	7.18
Max	7.20	9.20	8.00
Min	6.20	5.90	6.40
N	4	6	5
S.D.	0.45	1.16	0.71
Stat.Diff.	---	No	No
<b><u>Ametryn, mg/L (MDL = 2.0 ug/L)</u></b>			
Mean	0.001	0.001	0.001
Max	0.001	0.001	0.001
Min	0.001	0.001	0.001
N	5	6	5
S.D.		0.000	0.000
Stat.Diff.	---	---	---
<b><u>Atrazine, mg/L (MDL = 2.0 ug/L)</u></b>			
Mean	0.001	0.001	0.001
Max	0.001	0.001	0.001
Min	0.001	0.001	0.001
N	5	6	5
S.D.		0.000	0.000
Stat.Diff.	---	---	---

**TABLE 4.6**  
**OTHER PARAMETER RESULTS FOR**  
**G-251 LOCATION WHILE FEEDING COAGULANT**

	<b>FEED</b>	<b>MEMCOR EFFLUENT</b>	<b>ZENON EFFLUENT</b>
<b><u>2,4-D, mg/L (MDL = 0.5 ug/L)</u></b>			
<b>Mean</b>	0.00025	0.00025	0.00025
<b>Max</b>	0.00025	0.00025	0.00025
<b>Min</b>	0.00025	0.00025	0.00025
<b>N</b>	4	5	4
<b>S.D.</b>		0.00000	0.00000
<b>Stat.Diff.</b>	---	---	---

Notes:

(1) For values less than stated lab reporting limit, 0.5 of reporting limit used to compute means

(2) Stat. Diff. = Analysis of variance at 95% confidence interval

(3) N = Number of samples

(4) S.D. = Standard Deviation

### Total Organic Carbon and Color

The mean analytical results for TOC and Color were very similar in the feed and the Memcor and Zenon filtrate sample results as shown below:

	<b><i>Feed</i></b>	<b><i>Zenon Filtrate</i></b>	<b><i>Memcor Filtrate</i></b>
Average Color, PCUs	179	174	167
Average TOC, mg/L	34.5	31.3	33.8

For both Color and TOC, there were no statistically significant differences between the feed data and the Memcor and Zenon data sets. The microfiltration process had no observed impact upon the TOC and Color content of the ENR effluent waters.

### Total Alkalinity

The mean total alkalinity in the ENR effluent feed samples was equal to 179 mg/L as CaCO<sub>3</sub>. The Memcor and Zenon filtrate samples averaged 178 and 170 mg/L as CaCO<sub>3</sub>, respectively. There was no statistical difference between the feed and the Memcor or the Zenon filtrate data sets. There was no observed effect from the microfiltration process on the total alkalinity content of the ENR effluent waters.

### Nitrogen Series

The average results for the nitrogen samples collected at the pilot unit at the ENR effluent location are summarized below:

	<b><i>Feed</i></b>	<b><i>Zenon Filtrate</i></b>	<b><i>Memcor Filtrate</i></b>
TKN, mg/L as N	2.17	1.88	1.83
Ammonia, mg/L as N	0.066	0.075	0.050
NO <sub>3</sub> + NO <sub>2</sub> , mg/L as N	0.025	0.032	0.025

An approximate 16 percent reduction in TKN occurred as a result of microfiltration on both the Memcor and the Zenon units. No statistical analysis was conducted due to the limited number of samples analyzed (N = 3) for TKN (and Ammonia and Nitrate plus Nitrite as well). There was no discernible trend observed for the Ammonia or Nitrate

plus Nitrite data in comparing the average feed results to the filtrate data for the Memcor and the Zenon test units.

### Reactive Silica

The ENR effluent contained an average of 16.4 mg/L of reactive silica. The Memcor filtrate averaged 16.7 mg/L and the Zenon filtrate recorded an average of 14.4 mg/L of silica. The results of the analysis of variance indicated there was no statistical difference observed between the influent and the Memcor and Zenon filtrates with respect to reactive silica. The microfiltration process had no observed effect on the native content of reactive silica in ENR effluent waters.

### Herbicide Analyses

Table 4.6 provides a summary of the analyses conducted for the herbicides ametryne, atrazine, and 2,4-D on the MF feed and Memcor and Zenon filtrate samples. All values for the three herbicides were reported below respective laboratory method detection limits for the three herbicides.

### Metals Analyses

Table 4.6 provides the results of analyses performed on ENR effluent feed samples and Zenon and Memcor filtrate samples for the metals including sodium, zinc, calcium, copper, magnesium, manganese, mercury, molybdenum, and potassium. As shown by the results of the analyses of variances provided in Table 4.6, there were no significant differences between any of the metals data, with the exception of copper, when comparing feed data to the respective Zenon and Memcor filtrate results. With respect to copper, there was an insufficient number of samples ( $N = 2$ ) to perform an analysis of variance. Copper was added to the analytical suite of parameters after pilot unit investigations had commenced in order to comply with the FDEP requirements outlined in their newly developed *Marsh Readiness Protocol*. In the two samples that were collected from the feed and Zenon and Memcor filtrates, there were no detectable concentrations of copper found in any of the samples above the laboratory's method detection limit of 0.025 mg/L.

#### 4.8 FIELD TEST PARAMETERS

On-Site field analyses were performed throughout the MF field investigations for the parameters including pH, specific conductance (conductivity), and temperature. Table 4.7 provides the individual data points and the mean values for samples collected on the feed to the pilot unit and the Memcor and Zenon filtrates.

The mean values for these field parameters are summarized below:

	<i>Pilot Unit Feed</i>	<i>Memcor Filtrate</i>	<i>Zenon Filtrate</i>
pH, pH units	7.27	7.08	7.66
Temperature, Degrees C.	29.5	29.9	30.3
Conductivity, Microsiemens/ Centimeter	1232	1254	1233

The mean pH of the Pilot unit feed was within 10 percent of mean results for the Memcor and Zenon Filtrates. The mean pH for the Zenon filtrate was equal to 7.66 compared to the mean of 7.27 for the Pilot unit feed samples. This higher pH for the Zenon unit was anticipated due to the vigorous aeration that occurs in the Zenon process tank. This aeration process will have a tendency to volatilize the dissolved carbon dioxide content of the feed stream, producing a higher pH.

The average temperature of the feed samples was within 3 percent of the respective mean Memcor and Zenon filtrate results. No temperature change was anticipated between the feed and the MF filtrates due to the short (i.e., less than 1 hour) hydraulic retention times of the MF processes.

The mean conductivity results for the feed and the Memcor and Zenon filtrates were virtually identical. The mean conductivity for the feed samples was equal to 1,232 microsiemens per centimeter and equaled 1,245 and 1,233 for the Memcor and Zenon filtrate results, respectively.

The feed versus effluent dissolved oxygen values for the Memcor unit were virtually identical, recording an average of 1.95 and 1.96 for the Feed and Filtrate, respectively. Due to the aeration that occurs in the Zenon process tank, the dissolved oxygen of the

**TABLE 4.7**  
**FIELD MEASUREMENTS**

Performed By	Date	Run	Dock				Feed				Memcor Filtrate				Zenon Filtrate			
			pH	Temp. °C	DO (mg/L)	Conductivity (µS/cm)	pH	Temp. °C	DO (mg/L)	Conductivity (µS/cm)	pH	Temp. °C	DO (mg/L)	Conductivity (µS/cm)	pH	Temp. °C	DO (mg/L)	Conductivity (µS/cm)
E	11/1/96	4	7.07	26.8	0.85	1186												
E	11/4/96	5	6.55	25.5	7.5	499												
E	11/6/96	7	6.22	25.5	2.2	1038												
E	11/8/96	8	6.54	26.1	0.2	1273												
E	11/11/96	10	7.02	21.94	7.8	776												
E	11/13/96	12	6.59	20.01	8.78	737												
E	11/15/96	14	6.87	22.54	2.08	1349												
E	11/18/96	15	6.75	22.05	2.64	1227												
E	11/20/96	17	6.42	20.97	8.91	1270												
E	11/22/96	19	6.81	24	0.55	1170												
S	4/11/97	46	6.74	24.8	1.4	1153												
S	4/18/97	49	7.85	23.6	4.3	964												
S	4/25/97	52	7.27	25.6	3.1	997												
S	5/2/97	55	7.03	32.1	1.3	1067												
S	5/9/97	57	7.71	28.5	-	1080												
O	5/16/97	61	7.92	27.1	4.9	960	7.78	28.3	5.2	1038	7.73	28.6	4.7	1041				
O	5/21/97	64					7.6	-	-	910	7.2	-	-	950	7.8	-	-	
O	5/22/97	65					7.51	-	-	930	7.2	-	-	920	7.84	-	-	
S	5/23/97	66	7.43	29.5	2.9	1073	7.72	28.2	2.6	1026	7.5	29.2	4.2	996	8.01	29.6	4.7	
O	5/28/97	68					7.56			880	6.3			950	7.6			
O	5/29/97	69					7.3			1040				7.17			990	
S	5/30/97	69b	7.49	29.4	3.6	989	7.46	29.7	3.7	999				7.5	31	5.6	1104	
O	6/3/97	72					7.7			800	6.5			850	7		880	
O	6/9/97	76					7.38			880	7.28			880	7.84		880	
S	6/11/97	78	8.17	29.5	-	917	8.01	29.5	-	932	7.72	30.2	-	920	8.29	30.1	-	
S	6/13/97	79	7.88	31	-	974	7.96	30.5	-	915	7.64	30.8	-	921	8.16	30.8	-	
O	6/17/97	82					7.45			980	7.22			920	7.7		920	
O	6/18/97	83					7.39			870	7.23			870	7.72		870	
O	6/30/97	85					7.03			1220	6.88			1210	7.5		1190	
O	7/1/97	86					7.15			1190	7.06			1190	7.54		1180	
O	7/2/97	87					7.18			1130	7.05			1150	7.7		1150	
O	7/3/97	88					7.57			1300	7.36			1310	7.85		1280	
O	7/8/97	90					7.24			1320	7.08			1330	7.61		1310	
S	7/11/97	93	7.24	30	2.8	1469	7.3	29.5	1.2	1423	7.01	29.2	1.2	1442	7.93	29.5	4.3	
O	7/14/97	94					6.96			1290	6.89			1270	7.5		1290	
O	7/17/97	97					7			1280	6.99			1250	7.52		1250	
O	7/18/97	98					7			1270	6.95			1290	7.53		1290	
O	7/22/97	100					6.93			1330	6.96			1330	7.33		1330	
S	7/23/97	101	7.4	29	-	1752	7.39	29.2		1839	7.16	29.7		1733	7.86	30.2	1626	
O	7/24/97	102					6.95			1370	6.85			1380	7.5		1360	
O	7/25/97	103					7.14			1170	7.05			1180	7.55		1170	
O	7/28/97	104					7.06			1390	7.02			1390	7.45		1370	
S	7/30/97	105	7.27	29.3	-	1495	7.23	29.4	-	1381	7.08	30.8	-	1443	7.75	30.8	-	
O	7/31/97	106					7.13			1290	7.1			1290	7.49		1280	
S	8/6/97	110	7.23	28.2	0	1339	7.22	27.8	0	1482	7.09	27.9	0.5	1431	7.8	28.5	4.6	
O	8/8/97	112					6.95			1450	6.87			1450	7.61		1400	
O	8/11/97	113					7.1			1390	7.4			1400	7.75		1380	
O	8/12/97	114					6.93			1370	6.89			1380	7.64		1380	
S	8/13/97	115	7.32	30.3	0.4	1672	7.24	29.5	0.4	1597	6.95	29.7	0.5	1502	7.77	29.8	3.4	
O	8/14/97	116					6.79			1270	6.48			1290	7.4		1270	
O	8/15/97	117					6.89			1450	6.75			1470	7.25		1480	
S	8/20/97	119	7.24	30.1	1.1	1584	7.25	32.2	0.7	1465	7.2	32.5	1.3	1556	7.93	33.1	3.7	
O	8/21/97	120					7.13			1320	7.11			1340	7.8		1310	
O	8/25/97	122					7.15			1330	7.14			1330	7.77		1310	
O	8/26/97	123					7.04			1320	7.05			1310	7.56		1300	
S	8/27/97	124	7.36	31.1	1.4	1428	7.29	29.6	1.8	1606	7.19	30.8	1.3	1625	7.96	30.4	3.9	
O	8/28/97	125					7.1			1310	7.08			1300	7.62		1300	
<b>AVERAGE</b>			<b>7.16</b>	<b>26.8</b>	<b>3.12</b>	<b>1164</b>	<b>7.27</b>	<b>29.5</b>	<b>1.95</b>	<b>1232</b>	<b>7.08</b>	<b>29.9</b>	<b>1.96</b>	<b>1245</b>	<b>7.66</b>	<b>30.3</b>	<b>4.31</b>	<b>1223</b>

Notes:  
E = Everglades Laboratory  
S = Savannah Laboratory  
O = On-site analysis by field personnel

filtrate averaged 4.31 mg/L versus a feed average of 1.95 mg/L. Full scale applications of the Zenon process would tend to increase the levels of dissolved oxygen in the receiving water streams.

#### **4.9 BACKWASH SOLIDS ANALYTICAL RESULTS**

Table 4.8 provides the average analytical results for the settled solids when using ferric chloride as a coagulant. Even though these settled materials are referred to as "solids", the results of the analyses are provided in units of mg/L due to their dilute nature. As shown in Table 4.8, the suspended solids content of these backwash solids range from 1.4 to 2.2 percent (14,500 to 22,900 mg/L TSS). In general, solids results are not routinely reported on a dry weight "mass per mass" basis unless their content is in the minimum range of 8 to 10 percent and accordingly, the results for the subject backwash solids are provided in terms of milligram per liter.

As shown in Table 4.8, the total phosphorus content of the backwash solids ranged from a low 18 mg/L to a high of 44 mg/L and the TKN concentration varied from 101 mg/L as N to a high of 450 mg/L as N.

During time periods when ferric chloride was used as the coagulant, the iron content of the settled backwash solids ranged from 3,900 to 4,600 mg/L. This relatively high level of iron was anticipated since the majority of the iron used as coagulant will be retained with the solids generated from the MF backwash process.

Table 4.9 provides the average analytical results for the settled solids when using Alum as the coagulant. Suspended solids ranged from 0.5 to 1.9 percent (5,100 to 19,200 mg/L of TSS). The total phosphorus content of the alum precipitated solids varied from a low of 8 mg/L as P to 61 mg/L as P.

An elevated value for iron was reported for the Memcor backwash solids while the pilot unit was located at the ENR effluent location and alum was being used as the coagulant. As indicated in Table 4.9, the average iron content of the backwash solids during this period was equal to 4,200 mg/L which was higher than the average of 700 mg/L recorded for alum. During the time the field trailer was located at the ENR effluent location, the Memcor pilot unit was shut down for repairs for a period of several days. The repairs included replacement of various solenoid valves to eliminate compressed air leaks and the "pinning" of several membrane strands that had developed small leaks. During these repairs, unreacted concentrations of ferric chloride could have potentially

**TABLE 4.8**  
**AVERAGE OF BACKWASH SOLIDS RESULTS (mg/L)**  
**(FERRIC CHLORIDE AS COAGULANT)**

<i>Parameter</i>	<i>G-250</i>		<i>G-251</i>	
	<i>ENR Influent</i>		<i>ENR Effluent</i>	
	<i>Memcor</i>	<i>Zenon</i>	<i>Memcor</i>	<i>Zenon</i>
Total Suspended Solids	14,500	14,700	22,900	18,600
Total Phosphorus	18	18	44	17
TKN as N	450	200	101	140
Reactive Silica	72	22	48	--
Zinc	0.6	0.7	0.9	0.7
Copper	0.6	0.4	0.9	0.8
Iron	4,600	4,300	3,900	4,300
Aluminum	700	300	1,200	500
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	0.087	3.7	0.14	0.14
Manganese	2.1	16	6.6	13
TCLP	All samples non-hazardous			

**TABLE 4.9**  
**AVERAGE OF BACKWASH SOLIDS RESULTS (mg/L)**  
**(ALUM AS COAGULANT)**

<i>Parameter</i>	<i>G-250</i>		<i>G-251</i>	
	<i>ENR Influent</i>		<i>ENR Effluent</i>	
	<i>Memcor</i>	<i>Zenon</i>	<i>Memcor</i>	<i>Zenon</i>
Total Suspended Solids	19,200	15,800	16,800	5,100
Total Phosphorus	28	18	61	8
TKN as N	180	120	380	60
Reactive Silica	39	9	18	14
Zinc	0.5	0.5	1.2	0.6
Copper	0.2	0.1	--	--
Iron	80	110	4,200	300
Aluminum	1,200	1,000	700	300
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	0.03	0.01	0.13	0.005
Manganese	2.2	4.6	5.4	4.2
TCLP	All samples non-hazardous			

leaked into backwash tank designated to retain the alum coagulant residual solids, resulting in the unexpectedly high iron content.

Prior to final disposal of the accumulated backwash solids, representative samples were collected and submitted to the laboratory for Toxicity Characteristics Leachate Procedure (TCLP) analysis, to determine if the pilot unit residuals would be classified as a hazardous waste. The results of the full suite of TCLP testing performed on MF solids residuals are provided in Table 4.10. The test results were negative for all parameters and barium was the only parameter encountered above the laboratory's respective method detection limits. On the residual sample collected on July 18, 1997, barium was detected at a concentration of 2.6 mg/L. This value is well below the regulatory threshold value of 100 mg/L for barium.

Residual solids generated from the MF pilot study possess relatively high nutrient (nitrogen and phosphorus) content and are non-hazardous as defined by the TCLP test procedure. The solids also contain other micronutrients such as copper and manganese. Reuse of these residuals as a beneficial agricultural soil amendment should be closely evaluated as part of future investigations related to the feasibility of full-scale applications of MF technologies. When applied to agricultural lands, these residual solids could serve as a source of slow release phosphorus and nitrogen (potentially reducing soil fertilization needs) and return beneficial organic material to soils.

Application of these residuals to local agricultural lands would also significantly reduce the costs associated with other residual solids handling scenarios such as dewatering and landfill disposal.

#### **4.10 BACKWASH SOLIDS PRODUCTION RATES**

Residual solids generated by the Memcor and Zenon units were discharged to respective 2,500-gallon above ground plastic tanks, and the heavier solids settled to the bottom. Backwash waters were continuously discharged into these plastic tanks and the supernatant overflow was returned to the ENR. The hydraulic retention time (i.e., settling time) these tanks was on the order of 8 hours (Memcor) and 3 days (Zenon) when the pilot units were operating 24 hours per day. After performing TCLP analyses, the solids generated during the pilot unit studies were collected and discharged into the wastewater collection system by a licensed waste hauler.

Solids accumulation rates were recorded on a routine basis throughout the pilot study by measuring the increase in height of accumulated solids contained in each storage

**TABLE 4.10  
TOXICITY CHARACTERISTIC LEACHING PROCEDURE**

**TCLP Analysis** - The Toxicity Characteristic Leaching Procedure (TCLP) is used to characterize wastes as hazardous or non-hazardous based on the Toxicity Characteristic Rule published in the Federal Register (40CFR 261.24) in 1990. The rule lists 39 toxic substances and maximum concentrations for each.

The table below lists the federal limits for the Toxicity Rule and the results of samples collected on July 18, 1997, and September 5, 1997 submitted for laboratory analysis for the full TCLP suite.

PARAMETERS	EPA METHOD REFERENCE	FEDERAL LIMITS (mg/L)	7/18/97 RESULTS (mg/L)	9/5/97 RESULTS (mg/L)	REPORTING LIMIT (mg/L)
<b>Metals (mg/L)</b>					
Arsenic	6010	5.0	<0.10	<0.25	0.05
Barium	6010	100.0	2.6	<1.0	1
Cadmium	6010	1.0	<0.0050	<0.0050	0.005
Chromium	6010	5.0	<0.050	<0.050	0.05
Lead	6010	5.0	<0.050	<0.050	0.05
Mercury	7470	0.2	<0.020	<0.00020	0.02/0.0002*
Selenium	6010	1.0	<0.050	<0.050	0.05
Silver	6010	5.0	<0.010	<0.025	0.01
<b>Volatiles (mg/L)</b>					
Benzene	8240	0.5	<0.10	<0.10	0.02
Carbon tetrachloride	8240	0.5	<0.10	<0.10	0.02
Chlorobenzene	8240	100.0	<0.10	<0.10	0.02
Chloroform	8240	6.0	<0.10	<0.10	0.02
1,2-Dichloroethane	8240	0.5	<0.10	<0.10	0.02
1,1-Dichloroethylene	8240	0.7	<0.10	<0.10	0.02
Methyl ethyl ketone	8240	200.0	<0.50	<0.50	0.1
Tetrachloroethylene	8240	0.7	<0.10	<0.10	0.02
Trichloroethylene	8240	0.5	<0.10	<0.10	0.02
Vinyl chloride	8240	0.2	<0.20	<0.20	0.04
<b>Semivolatiles (mg/L)</b>					
o-Cresol	8270	200.00**	<0.15		0.05
m-Cresol	8270	200.00**	<0.15		0.05
p-Cresol	8270	200.00**	<0.15		0.05
Cresol	8270	200.00**	<0.15	0.19	0.05
1,4-Dichlorobenzene	8270	7.5	<0.15	<0.05	0.05
2,4-Dinitrotoluene	8270	0.13	<0.13	<0.05	0.05
Hexachlorobenzene	8270	0.13***	<0.13	<0.05	0.05
Hexachlorobutadiene	8270	0.5	<0.15	<0.05	0.05
Hexachloroethane	8270	3.0	<0.15	<0.05	0.05
Nitrobenzene	8270	2.0	<0.15	<0.05	0.05
Pentachlorophenol	8270	100.0	<0.77	<0.25	0.25
Pyridine	8270	5.0***	<3.1	<1.0	1
2,4,5-Trichlorophenol	8270	400.0	<0.15	<0.05	0.05
2,4,6-Trichlorophenol	8270	2.0	<0.15	<0.05	0.05
<b>Pesticides (mg/L)</b>					
Chlordane	8080	0.030	<0.025	<0.025	0.025
Lindane	8080	0.4	<0.0025	<0.0025	0.0025
Methoxychlor	8080	10.0	<0.025	<0.025	0.025
Toxaphene	8080	0.5	<0.25	<0.25	0.25
Endrin	8080	0.02	<0.0050	<0.0050	0.005
Heptachlor	8080	0.008	<0.0025	<0.0025	0.0025
<b>Herbicides (mg/L)</b>					
2,4-D	8150	10.0	<0.025	<0.025	0.025
2,4,5-TP (Silvex)	8150	1.0	<0.025	<0.025	0.025

\* Different laboratory reporting limits during the two sampling events - first listed limit is for 7/18/97 and the second 9/5/97.  
 \*\* If o-, m-, and p-cresol concentrations cannot be differentiated, the total cresol concentration is used.  
 \*\*\* Quantitation limit is greater than the calculated regulatory level. The quantitation level therefore becomes the regulatory level.

tank. During coagulant dosage optimization periods (i.e., time periods when the lowest coagulant doses was being used to achieve desired effluent characteristics), the calculated solids production rates are provided in Table 4.11.

At the ENR effluent station (Post-STA), solids production rates for Ferric Chloride averaged 30.8 and 117.2 pounds per million gallons (#/MG) of permeate produced for the Memcor and the Zenon units, respectively. For the ENR influent station (Post-BMP), the solids production rates for Ferric Chloride were equal to 45.6 and 91.7 pounds per million gallons for the Memcor and the Zenon units, respectively.

The measured solids accumulation rates listed for the Memcor unit were impacted by the relatively short 8-hour hydraulic retention time provided by the solids storage tank. This short retention time did not allow sufficient time for optimal solids settling. The approximate 3-day hydraulic retention time for the Zenon storage tank enabled the solids to settle and accumulate in the bottom of the tank. The Zenon solids production rates are considered to more realistically represent the amount of solids that are generated by the MF process. Future studies assessing the full -scale applications of MF technologies should include the establishment of a long-term solids storage lagoon possessing a hydraulic retention time of a minimum of 7 to 10 days.

#### **4.11      SFWMD LOW LEVEL MERCURY ANALYTICAL RESULTS**

Representatives from the SFWMD collected feed and Memcor/Zenon filtrate samples for trace level mercury analysis several time during the pilot study field investigations. Analyses were performed for filtered/total filtered methyl mercury and filtered and total mercury on representative grab samples of feed and MF filtrate samples. Total mercury and methyl mercury analyses were also collected and analyzed on the Memcor and Zenon backwash solids as well. Table 4.12 provides the results of all the individual analyses performed by the SFWMD and also provides the mean values for all data. The mean data results are listed below:

**TABLE 4.11**  
**SOLIDS PRODUCTION RATES**

<b><i>PILOT UNIT</i></b>	<b><i>LOCATION</i></b>	<b><i>RUN NUMBERS</i></b>	<b><i>COAG. TYPE</i></b>	<b><i>PERCENT SOLIDS PRODUCED</i></b>	<b><i>COAG. AVERAGE DOSAGE (MG/L)</i></b>	<b><i>DRY SOLIDS PRODUCED (#/MG OF PERMEATE PRODUCED)</i></b>
MEMCOR	ENR INFLUENT	85-104	FERRIC CHLORIDE	1.9	8.5 as Fe	45.6
MEMCOR	ENR EFFLUENT	76 – 84	FERRIC CHLORIDE	3.3	3.2 as Fe	30.8
ZENON	ENR INFLUENT	85 – 104	FERRIC CHLORIDE	1.5	9.1 as Fe	91.7
ZENON	ENR EFFLUENT	76 - 84	FERRIC CHLORIDE	1.9	2.7 as Fe	117.2
MEMCOR	ENR INFLUENT	105 - 118	ALUM	1.9	6.7 as Al	42.7
MEMCOR	ENR EFFLUENT	51 - 66	ALUM	1.9	2.2 as Al	20.2
ZENON	ENR INFLUENT	105 - 118	ALUM	1.6	5.8 as Al	108.6
ZENON	ENR EFFLUENT	51 - 65	ALUM	0.5	1.8 as Al	24.5

**TABLE 4.12  
SFWMD LOW LEVEL MERCURY WATER QUALITY RESULTS**

**Water Analysis (Concentrations in ng/L)**

DATE SAMPLED	PILOT UNIT LOCATION	FEED				MEMCOR EFFLUENT				ZENON EFFLUENT			
		MMHG	THG	MMHGF	THGF	MMHG	THG	MMHGF	THGF	MMHG	THG	MMHGF	THGF
5/5/97	G-251	0.054	0.690	0.048	0.680	0.050	0.500	0.044	0.860	0.047	0.650	0.047	0.650
5/19/97	G-251	0.019	0.840	0.017	1.100	0.033	0.960	0.017	1.100	0.020	0.860	0.023	1.400
6/3/97	G-251	0.023	1.600	0.023	2.600	---	---	---	---	0.022	1.100	0.023	2.100
6/16/97	G-251	0.022	1.100	0.026	1.100	0.026	0.720	0.026	0.980	0.022	1.400	0.026	1.000
7/14/97	G-250	0.035	---	0.028	---	0.033	---	0.022	---	0.047	---	0.044	---
7/31/97	G-250	0.290	---	0.278	---	0.290	---	0.250	---	0.220	---	0.238	---
8/12/97	G-250	0.029	---	0.041	---	0.031	---	0.030	---	0.088	---	0.080	---
Average		0.067	1.058	0.066	1.370	0.077	0.727	0.065	0.980	0.067	1.003	0.069	1.288

**Solids Results (Concentrations in ng/g dry weight)**

Date	Sample Description	MMHG	THG
7/14/97	Memcor - Backwash Solids	6.80	24.22
7/31/97	Memcor - Backwash Solids	7.16	26.62
7/31/97	Zenon - Bleed Solids	7.25	12.89

**Notes:**

MMHG = Methyl Mercury; THG = Total Mercury; MMHGF = Methyl Mercury-Filtered; THGF = Total Mercury-Filtered

<b>TABLE 4.13</b>											
<b>MEAN SFWMD LOW LEVEL MERCURY WATER QUALITY RESULTS</b>											
<b>FEED</b>				<b>MEMCOR EFFLUENT</b>				<b>ZENON EFFLUENT</b>			
MHG	THG	MHF	THGF	MHG	THG	MHF	THGF	MHG	THG	MHF	THGF
0.067	1.058	0.066	1.370	0.077	0.727	0.065	0.980	0.067	1.003	0.069	1.288

Note: All values in nanograms/liter (ng/L). MHG = methyl mercury; THG = total mercury; MHF = filtered methyl mercury; THGF = total filtered mercury

The average total mercury of the feed samples was equal to 1.058 ng/L compared to 0.727 and 1.003 ng/L of total mercury recorded for the Memcor and Zenon filtrate samples respectively. Total mercury was reduced approximately 5 percent by the Zenon unit and 31 percent by the Memcor system. No conclusions can be made about the filtered mercury results because, in most instances, the filtered values were higher than the corresponding total numbers. The MF process had no observed effect upon the methyl mercury results as the feed and Memcor/Zenon filtrate values were virtually the same.

Trace levels of total mercury may be moderately reduced by microfiltration but MF has no observed impact upon trace methyl mercury concentrations. Mercury removed by MF is accumulated in the backwash solids as shown in the solids analytical results contained in Table 4.12.

#### **4.12 BIOASSAY AND ALGAL GROWTH POTENTIAL (AGP) RESULTS**

Bioassay and AGP analyses were performed by the FDEP Biology Section on microfiltration treatment technology water samples collected during the period of 3/24/97 through 8/18/97. Summary results for the bioassay analyses are provided in Table 4.14. The FDEP laboratory prepared a summary report (FDEP, October 1997) on the bioassay results (see Appendix 3). In the conclusions section, the report states:

Results of the toxicity tests indicate that only one of the twelve tests demonstrated statistically significant ( $p = 0.05$ ) decrease in water quality when comparing to influent to the Memcor effluent. Since the response was not extreme or recurrent, it is possible that a similar response in the receiving water population would not have a sustained impact.

**TABLE 4.14  
BIOASSAY TEST RESULTS**

<b>Sample Date</b>	<b>Test Species</b>	<b>Test Endpoint</b>	<b>Statistical/Diff. at 95% C. I. Influent vs. Control</b>	<b>Statistical/Diff. at 95% C. I. Effluent vs. Control</b>	<b>Statistical/Diff. at 95% C. I. Influent vs. Effluent</b>
3/24/1997 <sup>1</sup>	Selenastrum capricornutum	Growth, mg dry wt/L	Yes	Yes	No
	Ceriodaphnia dubia	Reproduction	No	Yes	Yes
	Cyprinella leedsi	Survival	No	No	No
		Growth	No	No	No
4/21/1997 <sup>2</sup>	Selenastrum capricornutum	Growth, mg dry wt/L	No	No	No
	Ceriodaphnia dubia	Reproduction	No	No	No
	Cyprinella leedsi	Survival	Yes	Yes	No
		Growth	No	No	No
7/17/1997 <sup>3</sup>	Selenastrum capricornutum	Growth, mg dry wt/L	No	Yes	No
7/23/1997 <sup>4</sup>	Selenastrum capricornutum	Growth, mg dry wt/L	No	No	No
	Ceriodaphnia dubia	Reproduction	No	No	No
	Cyprinella leedsi	Survival	No	No	No
		Growth	Yes	No	No
8/5/1997 <sup>5</sup>	Selenastrum capricornutum	Growth, mg dry wt/L	No	No	No
	Ceriodaphnia dubia	Reproduction	N/A	N/A	N/A
	Cyprinella leedsi	Survival	Yes	No	No
		Growth	Yes	No	No

**N/A - Not Available (Test cancelled due to excessive control mortality)**

1. FeCl<sub>3</sub> Coagulant Dosage was 5.5 mg/L as Fe

4. FeCl<sub>3</sub> Coagulant Dosage was 8.0 mg/L as Fe

2. Alum Coagulant Dosage was 2.0 mg/L as Al

5. Alum Coagulant Dosage was 2.2 mg/L as Al

3. FeCl<sub>3</sub> Coagulant Dosage was 9.0 mg/L as Fe

Table 4.15 provides the results of the AGP testing conducted by the FDEP Biology Section. With respect to the AGP test results, the FDEP report indicates:

AGP values for most of the samples were less than the practical quantitation limit, but greater than the minimum detection limit, meaning the apparent differences between AGP values may not be real.

Based upon the bioassay and AGP studies conducted by the FDEP laboratory, the MF process, overall, had no significant impact upon the test organisms. The total phosphorus concentrations in the samples received by the lab were too low to determine any meaningful AGP trends or relationships and 11 out of 12 bioassay tests showed no observed effect when comparing the Memcor/Zenon filtrates to the corresponding feed samples.

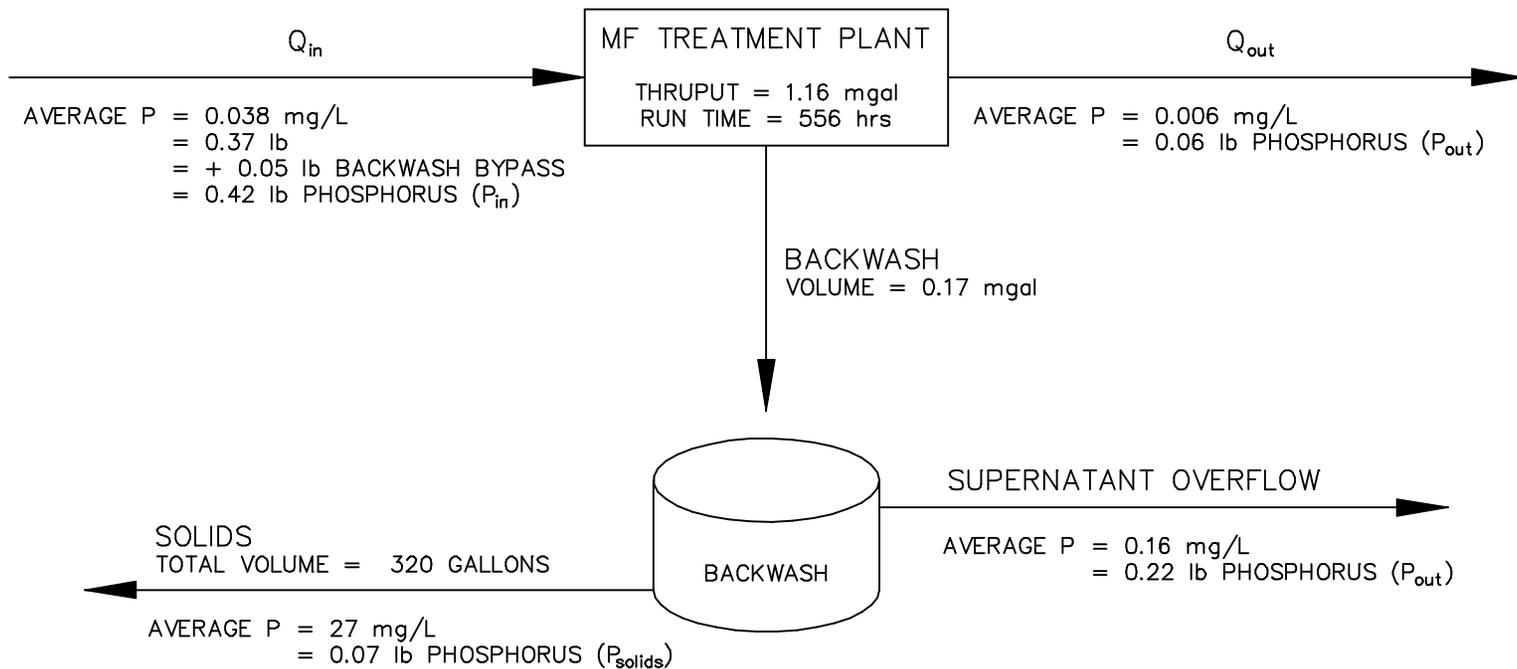
#### **4.13 TOTAL PHOSPHORUS MASS BALANCES**

Total phosphorus mass balances were determined from data collected during trials when the field trailer was located at both the ENR effluent and influent stations.

Phosphorus mass balance computations were conducted on data obtained during June 8 through June 19, 1997, while the pilot unit was located at the ENR effluent station and also during the time period of June 26 through July 28, 1997 for the ENR influent location. To complete these mass balances, the total mass of phosphorus coming into pilot unit was calculated for the time periods indicated and compared to the total mass of phosphorus contained in the filtrate and also in the backwash solids.

Figure 4.8 shows the results of the mass balance calculations conducted at the ENR influent location. A total of 0.42 pounds of phosphorus entered the Memcor pilot unit over the approximate 1-month time period and approximately 14 percent of this total (0.06 pound) was contained in the filtrate. The vast majority of the phosphorus was contained in the backwash solids equaling roughly 69 percent (0.29 pounds) of the total P mass entering the system.

Computing the difference between the phosphorus mass "in" versus the total mass discharged either in the solids or in the filtrate, results in a mass balance closure difference of 18 percent.



MASS BALANCE

$$\begin{aligned}
 P &= P_{out} + P_{sup} + P_{solids} \\
 0.42 &= 0.06 + 0.22 + 0.07 \\
 &= 18\% \text{ RELATIVE DIFFERENCE}
 \end{aligned}$$

figure 4.8

TOTAL PHOSPHORUS BALANCE  
AT THE G-250 LOCATION USING  $FeCl_3$

**TABLE 4.15  
ALGAL GROWTH POTENTIAL (AGP) TEST RESULTS**

<b>Sample Name</b>	<b>Mg Dry Weight Per Liter Sample</b>	<b>TP Mg/L</b>	<b>TKN Mg/L</b>	<b>Sample Name</b>	<b>Mg Dry Weight Per Liter Sample</b>	<b>TP Mg/L</b>	<b>TKN Mg/L</b>
<i>3/24/1997 Samples</i>				<i>7/15/97 Samples</i>			
Memcor/Zenon Influent	0.650	0.022	2.20	Memcor/Zenon Influent	0.166	0.025	N/A
Memcor Effluent	0.182	0.008	1.90	Memcor Effluent	0.241	0.007	N/A
Zenon Effluent	0.151	0.007	N/A	Zenon Effluent	0.214	0.004	N/A
<i>04/21/97 Samples</i>				<i>8/5/97 Samples</i>			
Memcor/Zenon Influent	0.277	N/A	N/A	Memcor/Zenon Influent	1.810	0.037	N/A
Memcor Effluent	0.093	N/A	N/A	Memcor Effluent	0.127	0.007	N/A
Zenon Effluent	1.482	N/A	N/A	Zenon Effluent	0.350	0.017	N/A
<i>5/29/97 Samples</i>				<i>8/18/97 Samples</i>			
Memcor/Zenon Influent	0.308	0.022	N/A	Memcor/Zenon Influent	0.765	0.042	N/A
Memcor Effluent	0.213	0.007	1.20	Memcor Effluent	0.094	0.010	N/A
Zenon Effluent	0.140	0.010	1.90	Zenon Effluent	0.474	0.009	N/A

**Notes:**

1. N/A - Not Available (Test cancelled due to excessive control mortality)
2. AGP results based on grab sample. Nutrient data from 24-hr composite samples.
3. Test practical quantitation limit = 1 mg/L

Figure 4.9 shows the results of the mass balance calculations conducted at the ENR effluent location. A total of 0.078 pounds of phosphorus entered the Memcor Pilot unit over the 11-day time period and of this total, 0.025 pounds of phosphorus was contained in the filtrate. Approximately 90 percent of the total mass of phosphorus (0.072 pounds) was contained in the backwash solids. At the ENR effluent location, a 22 percent mass balance difference between the amount of P "in" versus the amount contained in the filtrate and the solids was obtained.

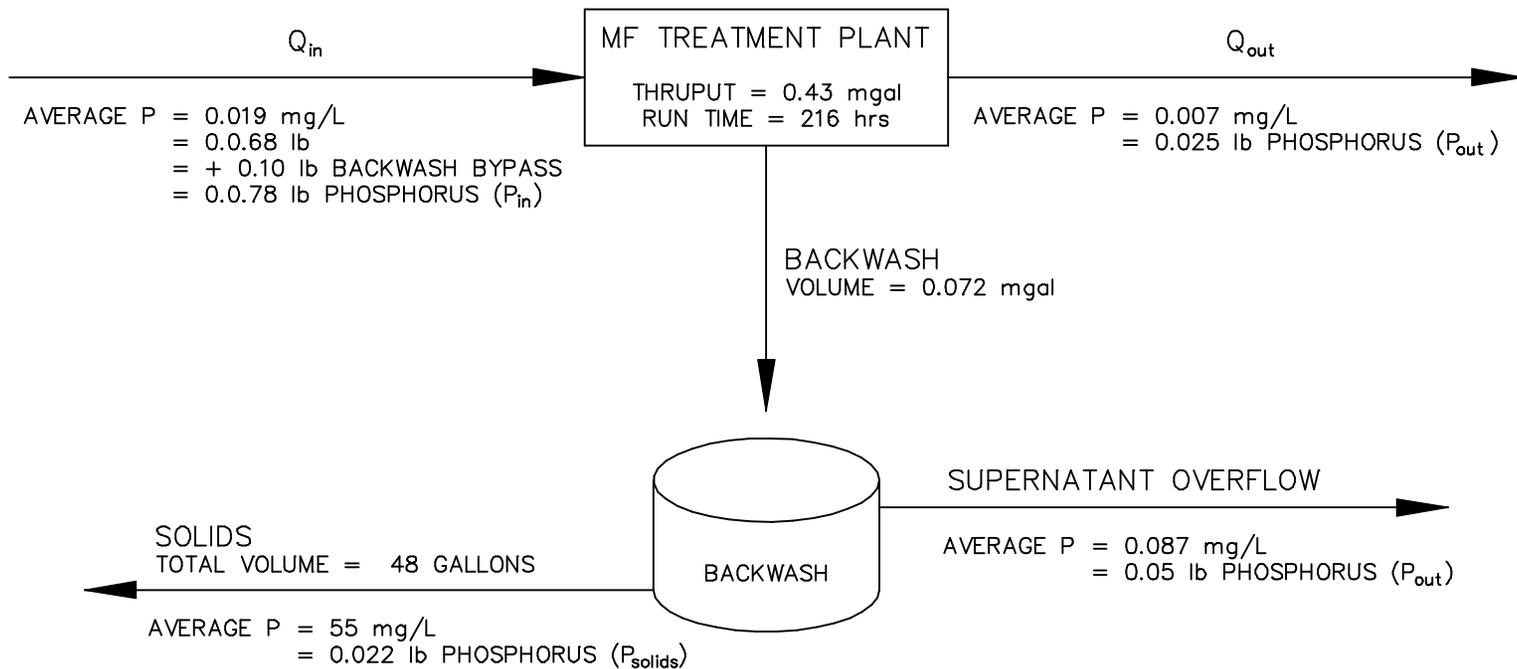
The observed mass balance closures are somewhat higher than desired for pilot study investigations. The primary source of potentially unaccounted phosphorus is associated with the solids being discharged with the supernatant overflow. These solids were measured 2 to 3 times per week compared to daily measurements of feed and permeate results. Even though relatively low in TSS concentration (typically 25 to 50 mg/L TSS), unaccounted quantities of phosphorus in the supernatant are considered to be one of the primary explanations for the phosphorus balances obtained.

Better mass balances could have been achieved by increasing the overall time allowed for solids settling. The 2 to 3-day maximum settling time allowed for during the current studies enabled fine particles to overflow in the supernatant stream instead of settling to the bottom of the solids tanks. Future solids handling and management investigations should include the assessment of a storage lagoon possessing a 7- to 10-day (or longer) hydraulic retention time.

#### **4.14      OPTIMIZATION OF PROCESS PARAMETERS INCLUDING FLUX AND CHEMICAL CLEANING**

The primary operating variables requiring process optimization for the Zenon and Memcor systems include the flux rate (volume of water through a unit area of membrane), backwash frequency and chemicals used to clean the membranes. An additional operating variable for the Zenon system is the amount of air required to effectively scour the membranes and reduce solids build – up on the membrane surface.

During the pilot unit investigations, several combinations of operating process variables were employed to determine the optimal setting for each one. The optimal combination of the process variables will result in less frequent chemical cleanings in conjunction with the highest flux rates. The optimal chemical cleaning regime will consist of the best combination of environmentally compatible chemicals coupled with the chemical's ability to effectively restore the flux rate of the membranes.



MASS BALANCE

$$\begin{aligned}
 P &= P_{out} + P_{sup} + P_{solids} \\
 0.078 &= 0.025 + 0.05 + 0.022 \\
 &= 22\% \text{ RELATIVE DIFFERENCE}
 \end{aligned}$$

figure 4.9

TOTAL PHOSPHORUS BALANCE  
AT THE G-251 LOCATION USING  $FeCl_3$

A series of graphs were constructed showing the effects of the various combinations of these process variables upon resulting TMP values for both the Memcor and the Zenon units. Effectiveness of specific combinations of the operational process variables are provided in the following Sections:

### Memcor Operating Variables and Results

Figure 4.10 provides a graph of the TMP versus run hours for the Memcor unit while located at the ENR influent. The high flux rate ranging from 84 to 93 GFD required the unit to be cleaned after 132 hours of operation. For the majority of this time, no coagulant was being fed to the unit and a backwash frequency of 0.3 hours (18 minutes) was being employed. After chemical cleaning with the Memclean solution, a flux rate of 71 GFD was initiated along with chemical addition of ferric chloride. This high flux rate coupled with chemical addition required the unit to be cleaned after only 17 hours of operation (run hours 162 through 179).

Longer run times between chemical cleanings were observed on the Memcor unit during use of an effective flux rate of 51 GFD in conjunction with a backwash frequency of 0.33 hours as shown on Figure 4.10 (run hours 1512 through 2090). A total of 578 hours of operation was logged on the Memcor unit before chemical cleaning was required. During this time, ferric chloride was being dosed at an average concentration of 8.5 mg/L as Fe.

The results of using Alum as the coagulant at an average dosage of 6.7 mg/L as Al, coupled with a flux rate of 52 GFD and a backwash rate 0.33 hours is graphically shown on Figure 4.10 (run hours 2160 through 2424). A total of 264 hours of operation was logged under these conditions prior to the need to chemically clean the membranes. These results suggest that alum coagulation produces shorter run times than with comparable dosages of ferric chloride. Under the same flux and backwash rates, ferric chloride coagulation produced an uninterrupted run time of 578 hours on the Memcor unit compared 264 hours of operation when using a similar Alum dosage rate.

Figure 4.11 provides the results of TMP versus run hours for the Memcor unit during the time the pilot unit was located at the ENR effluent station. The data shown on Figure 4.11 are similar to the results observed at the ENR influent location. High GFDs ranging from 66 to 73, resulted in short run times of 200 hours or less between required chemical cleanings.

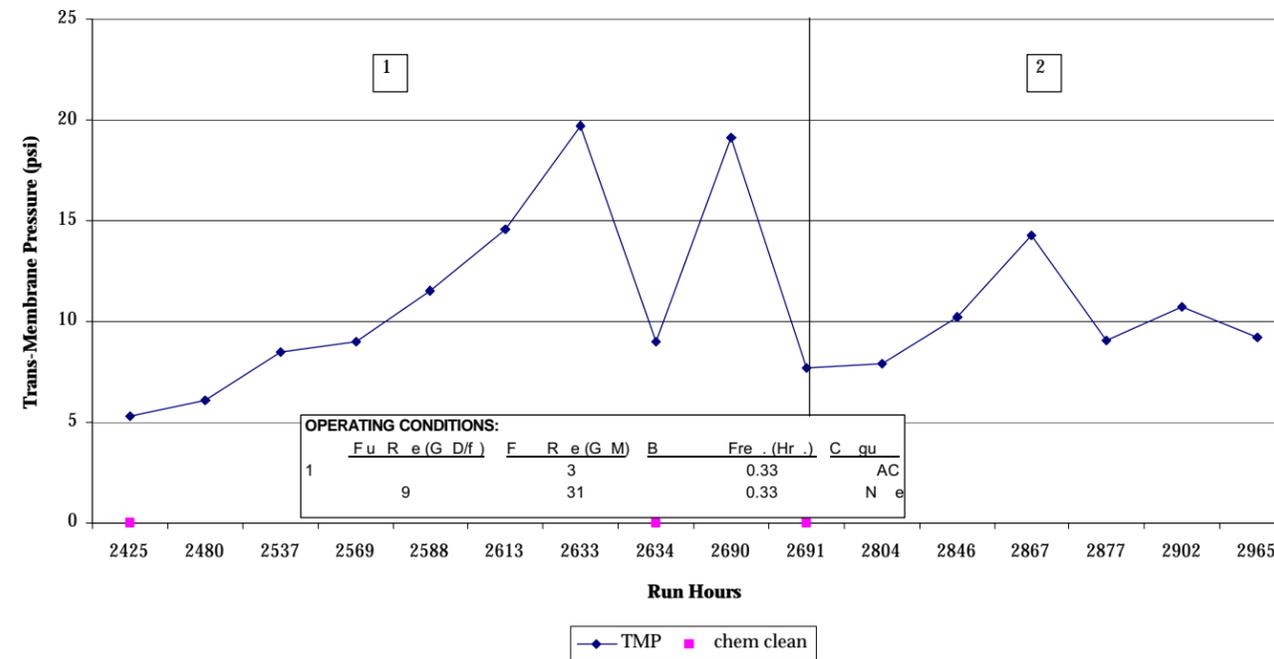
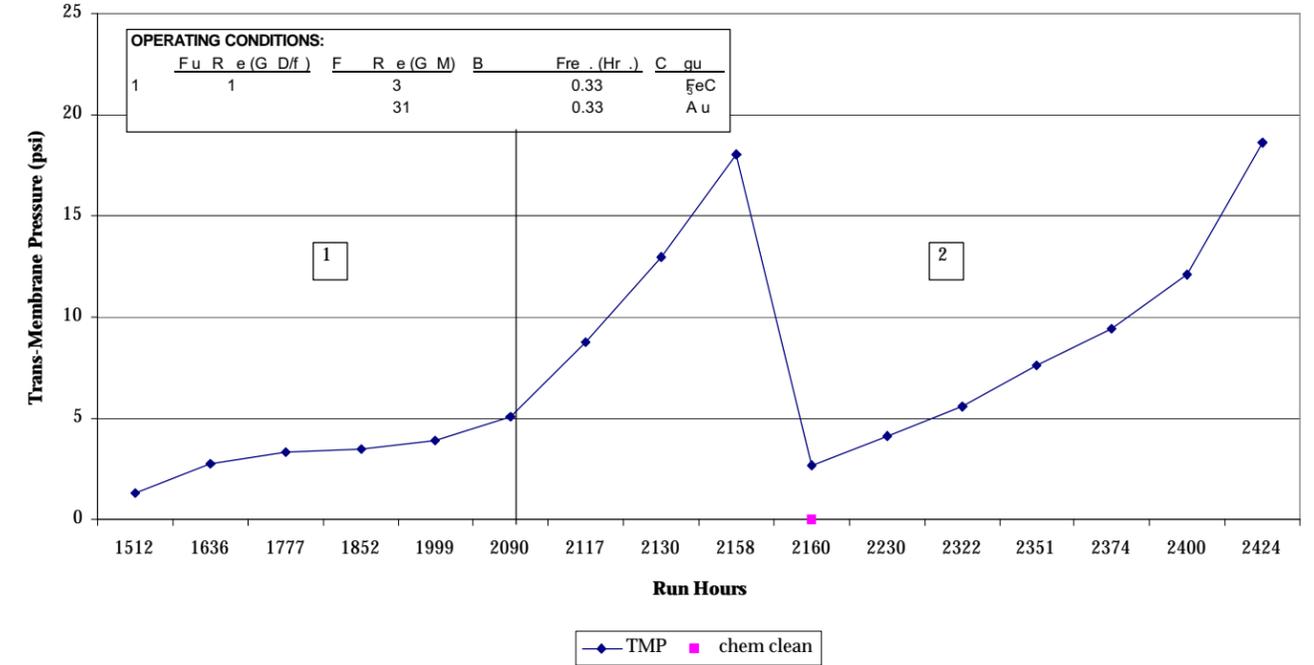
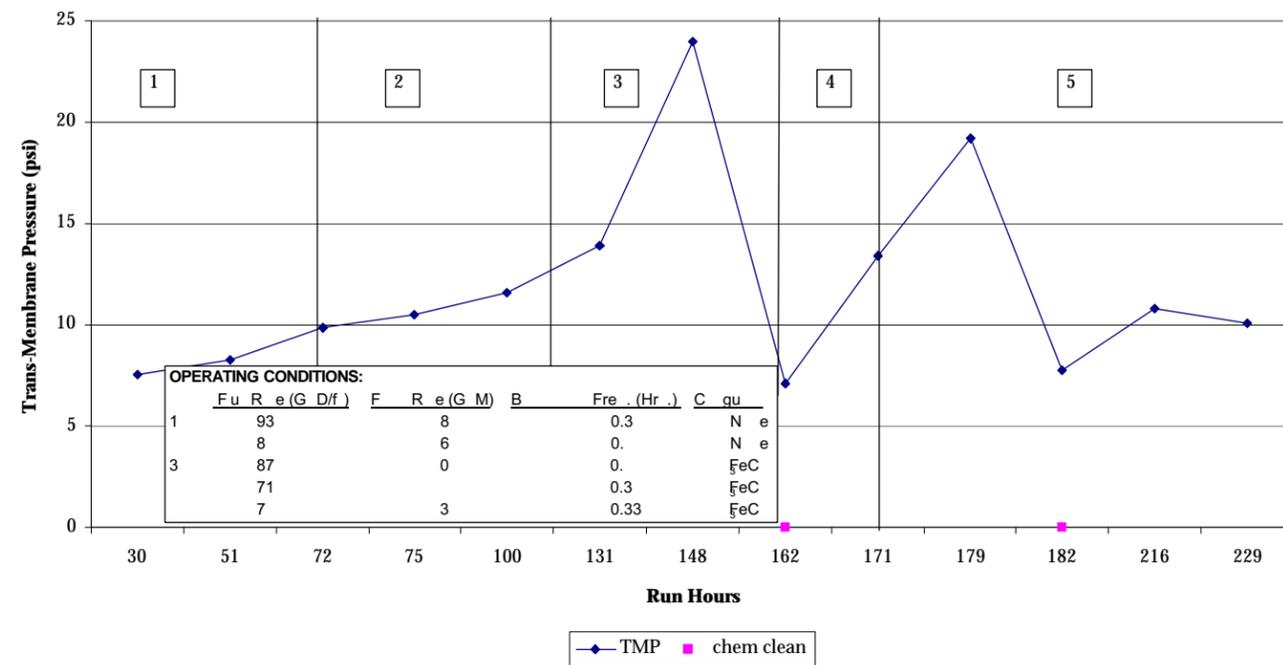


figure 4.10  
MEMCOR RUN HOURS VERSUS  
TRANS-MEMBRANE PRESSURE  
G-250 LOCATION

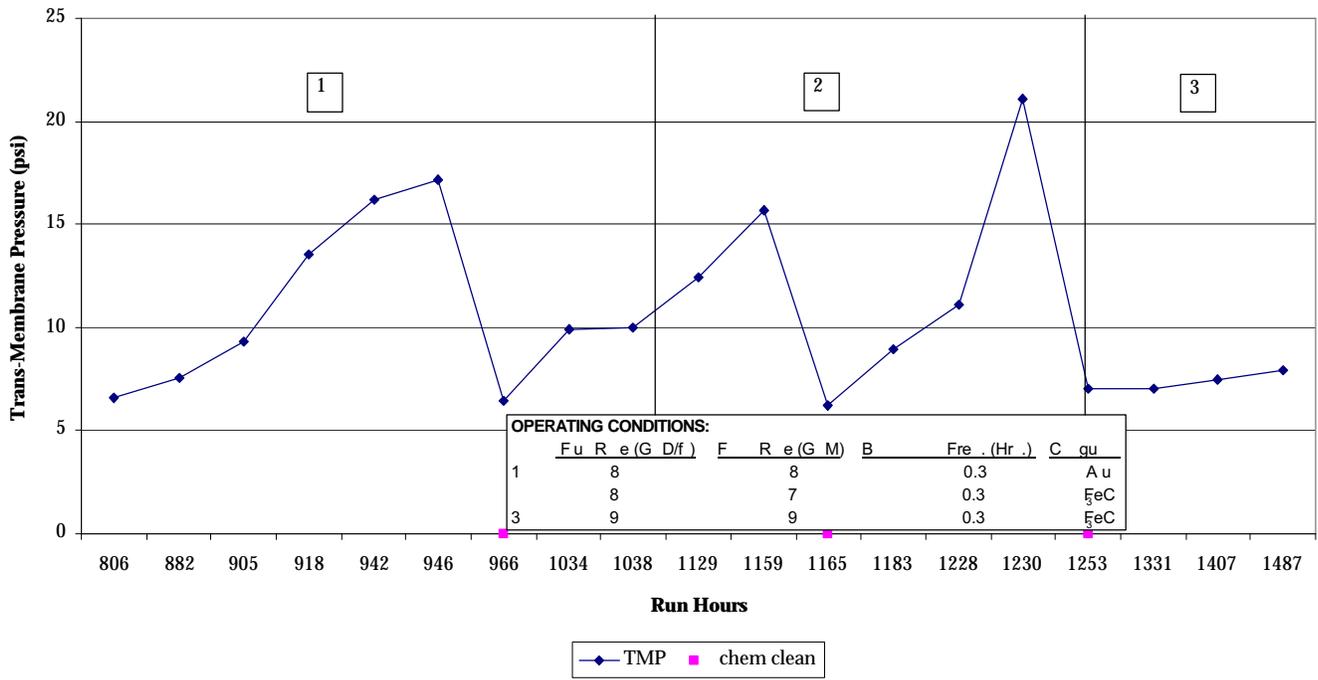
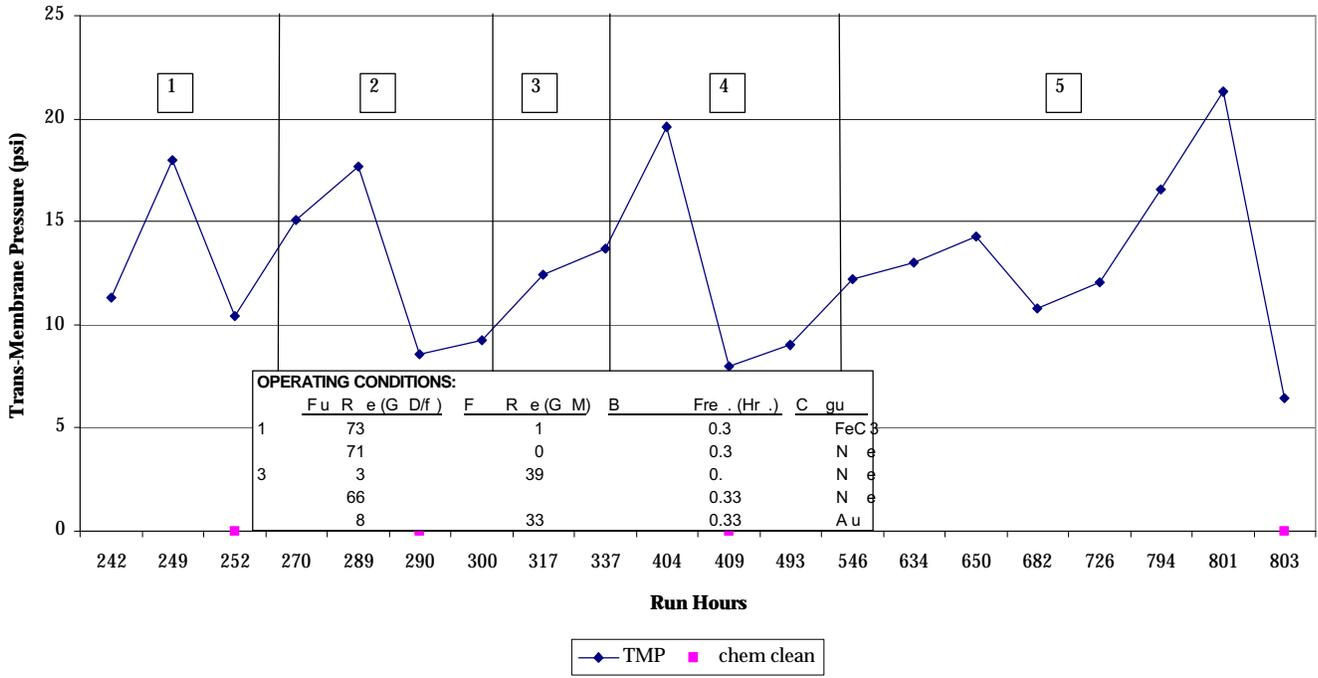


figure 4.11  
MEMCOR RUN HOURS VERSUS  
TRANS-MEMBRANE PRESSURE  
G-251 LOCATION

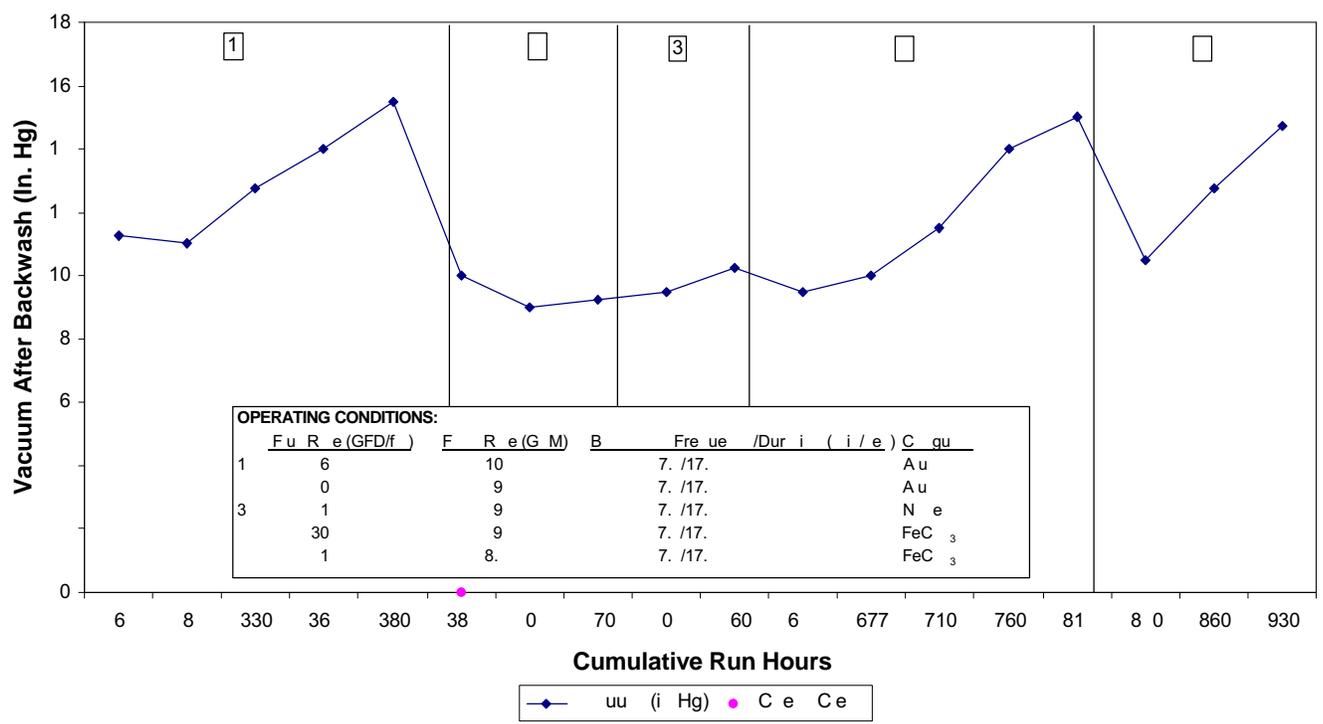
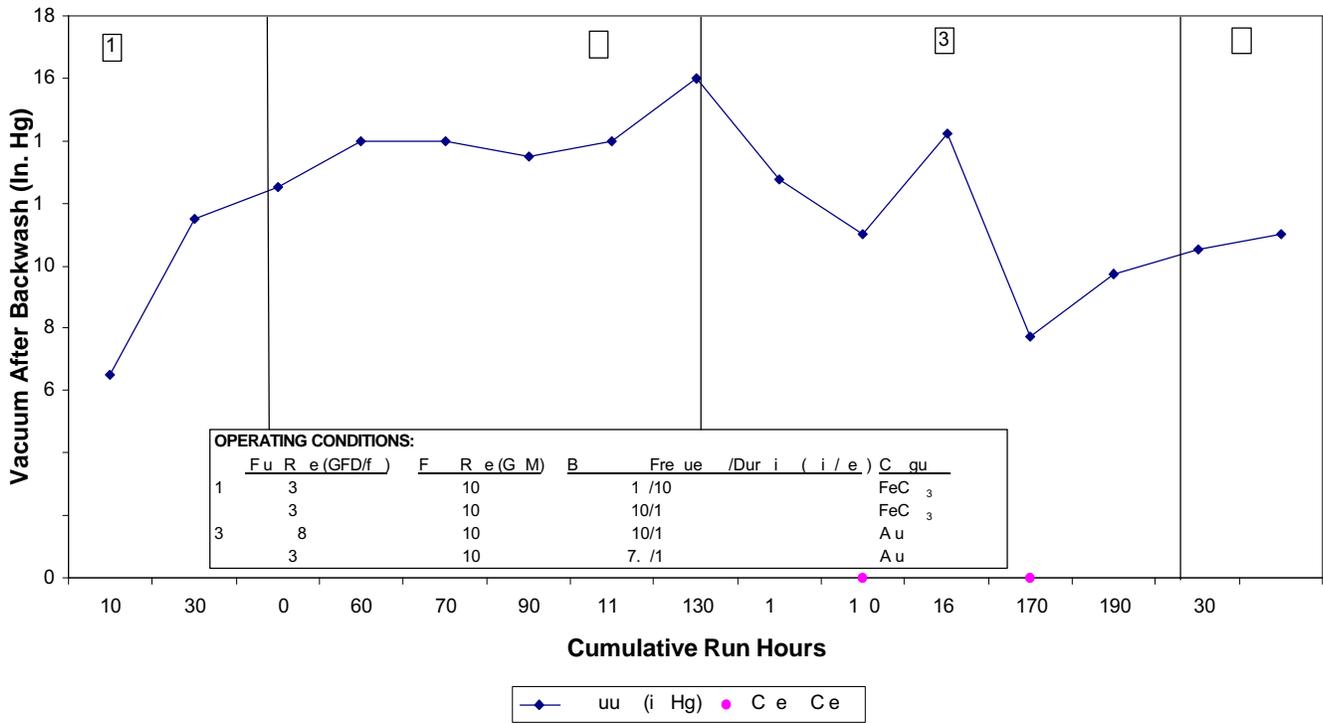


figure 4.12  
ZENON CUMULATIVE RUN HOURS  
VERSUS VACUUM AFTER BACKWASH  
G-251 LOCATION

The longest uninterrupted run time for the Memcor unit at the ENR effluent station occurred between run hours 546 through 803, a total of 257 hours. During this period, the effective flux rate was equal to 58 GFD and the backwash frequency was equal to 0.33 hours. An average dose of 1.8 mg/L of alum as Al was added during this period as well.

The Memtech Corporation was provided copies of all of the operating data collected on the Memcor unit during the entire pilot study. Memtech uses a proprietary computer program to summarize operating data and to determine optimal combinations of process variables. The results of the Memcor Corporation recommendations are provided below:

### **Memcor Corporation Process Variable Recommendations**

Flux Rate, GFD:	40
Chemical Cleaning Solution:	Citric Acid
Backwash Rate, hours:	0.33
Frequency of Chemical Cleanings (estimated), Days:	14 (336 hours)

### Zenon Operating Variables and Results

Instead of measuring loss of flux with increased transmembrane pressure differential as in the case of the Memcor unit, the Zenon unit measures the loss of flux by how much vacuum is required to draw the flow through the membranes. Normal vacuum operating ranges are between 6 and 14 inches of Hg. Vacuum readings in the 16 to 18 inches of Hg range call for flux restoration by means of chemical cleaning of the membranes. An additional difference between the Memcor unit and the Zenon is related to the method of backwash. Backwashing for the Zenon is described both in terms of the time between the intervals but also in terms of the duration of the actual backwash. A typical backwash combination for the Zenon unit would be an interval of every 10 minutes for a 10-second duration. This combination would be written as "10/10".

Figure 4.12 provides a graph of the vacuum versus run hours for the Zenon unit while located at the ENR effluent location. The results of operating the Zenon unit using higher GFDs, in the range of 28 to 32, are shown on Figure 4.12 during cumulative run hours times of between 10 and 245 hours. These flux ranges coupled with a backwash rate of between 12/10 to 10/15 resulted in total run time of 150 hours or less between required chemical cleanings.

Longer run times between chemical cleanings were logged when the flux rate was lowered to the range of 20 to 26 GFD during run hours 385 through 930 as shown on Figure 4.12. The Zenon unit was operated a total of 545 hours between chemical cleaning cycles at these lower flux rates in conjunction with more frequent backwashing (7.5/17.5). During this long run, both Alum and ferric chloride were fed at different times to the Zenon units at concentrations ranging from 2 to 5 mg/L.

Figure 4.13 provides the results of the vacuum readings versus run hours the Zenon while located at the ENR influent station. During run hours 930 through 1350, an average of 9.1 mg/L of ferric chloride, as Fe, was added to the unit and a total of 420 hours of uninterrupted run time was logged between chemical cleanings. During this period, a flux of 24 GFD was maintained and a backwash interval of 7.5/17.5 was adhered to for the majority of the run.

Under the approximate same operating conditions of flux and backwash, much shorter run times were observed on Figure 4.13 when Alum was fed to the unit at an average dose of 5.8 mg/L as Al. Using Alum instead of ferric chloride, while maintaining all other operating conditions the same, resulted in a maximum of 150 hours of uninterrupted operation between chemical cleanings.

The Zenon Corporation reviewed all of the operating data collected on their unit during the MF field investigations and developed the following recommendations for the full-scale process design:

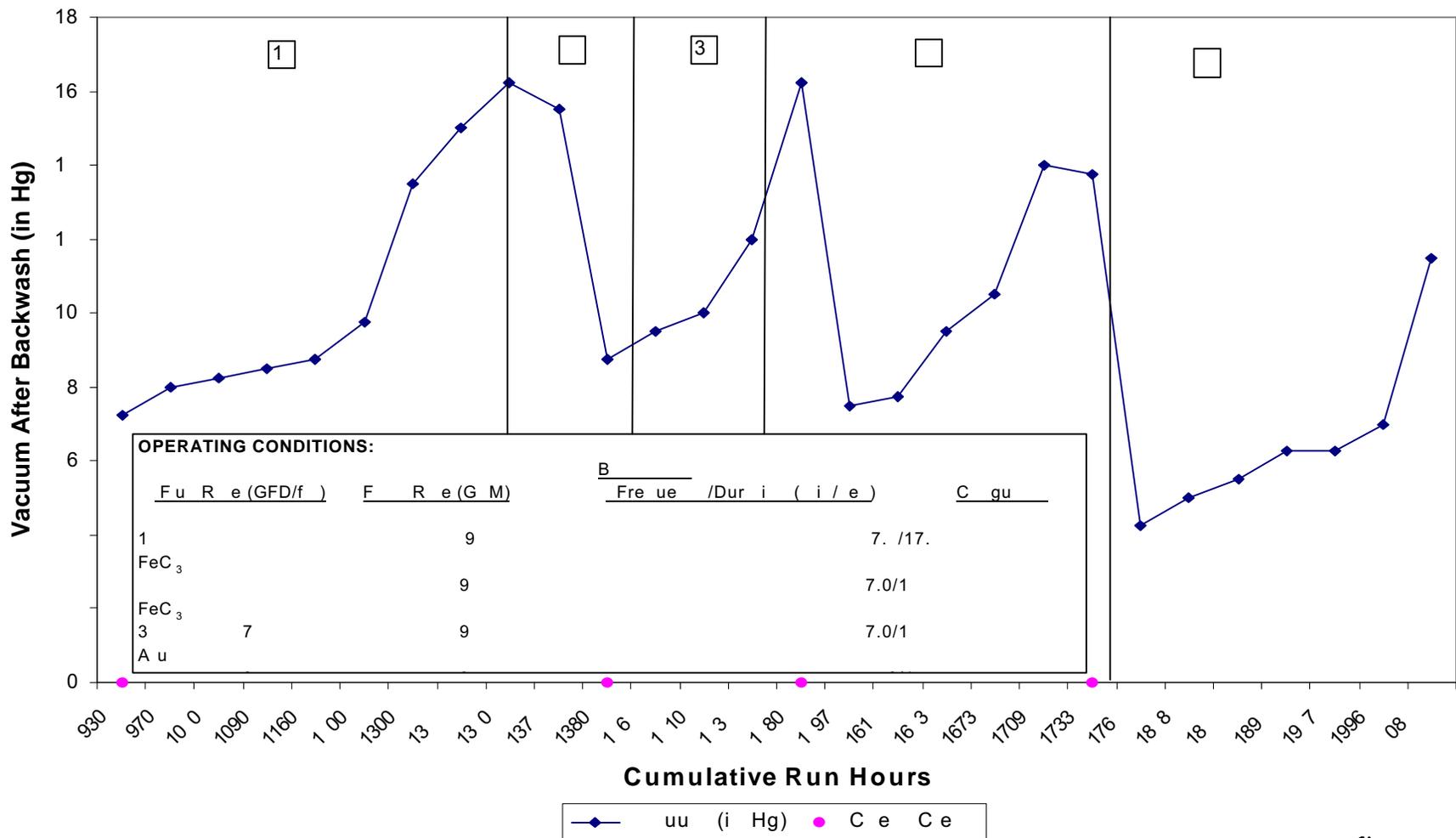


figure 4.13  
ZENON CUMULATIVE RUN HOURS  
VERSUS VACUUM AFTER BACKWASH  
G-250 LOCATION

### **Zenon Corporation Process Variable Recommendations**

Flux Rate, GFD:	40 <sup>1</sup>
Chemical Cleaning Solution:	Citric Acid/Chlorine
Backwash Rate:	7.5/10
Frequency of Chemical Cleaning, days:	14 (336 hours)

- <sup>1</sup> Zenon representatives indicated that a new generation of membranes had been developed by their Corporation with much higher effective flux rates than for those used and tested during the MF field investigations. Zenon used this study flux rate information and calculated a conservative modified flux rate for the new membranes. The 40 GFD rate listed above is for the new generation of membranes currently being marketed by Zenon.

### ***References***

American Public Health Agency, et. al.; Standard Methods for the Examination of Water and Wastewater, 19<sup>th</sup> Edition; 1995.

Florida Department of Environmental Protection; "Marsh Rediness Protocol"; December 1996.

Metcalf & Eddy, Inc.; Wastewater Engineering: Collection, Treatment, Disposal; McGraw-Hill Book Company, 1972.

## **5.0 CONCEPTUAL DESIGN AND PRELIMINARY COST ESTIMATE FOR A FULL SCALE MICROFILTRATION APPLICATION**

### **5.1 DEVELOPMENT OF HYDRAULIC AND TOTAL PHOSPHORUS DESIGN CRITERIA**

The South Florida Water Management District recently contracted PEER Consultants/Brown and Caldwell, J.V. to develop a standard of comparison for all supplemental technology demonstration projects (Peer Consultants/Brown and Caldwell, J.V., November 1997). This document establishes standard guidelines to be used for all demonstration research efforts related to sampling and testing programs, reporting of data and protocols used in assessing project results. Flow and total phosphorus data used in developing facility conceptual designs are required, by the standard of comparison guidelines, to be developed from the 10-year period of record baseline data used for preparing the detailed design for STA 2.

Generating this synthetic daily time series of inflow and outflow phosphorus information was based upon rescaling historical S5A and S6 flows and phosphorus loadings. Documentation received with this data indicated the following factors were ignored in developing this time series summary:

- BMP make-up water contributions to STA 2 (October – February time period);
- Attenuation of inflow concentration peaks due to STA storage and uptake; and
- Atmospheric phosphorus loads.

The program documentation also indicates that the effect of recently implemented BMPs in the EAA are accounted for by reducing the baseline historical phosphorus concentrations by 25 percent. Input assumptions (as described in the program documentation) made in creating these summaries included:

- The STA average outflow concentration will be equal to 50 ppb of phosphorus;
- The BMP load reduction, as indicated above, is equal to 25 percent; and
- The fraction of S5A flow diverted to STA 2 was equal to 0.163.

The period of record for the data series is from 1/1/79 through 9/30/88. The historical flow weighted mean total phosphorus concentration for this period was equal to 163.1 ppb for S6 plus an additional 16.3 percent of S5A. The computed STA inflow mean phosphorus concentration was equal to 122 ppb for the 9.75-year period of record.

## **5.2 DEVELOPMENT OF CONCEPTUAL DESIGNS FOR FULL-SCALE POST-BMP AND POST-STA TREATMENT FACILITIES**

### **5.2.1 ANALYSIS OF THE BASELINE PERIOD OF RECORD DATA AND ITS APPLICATION TO THE MF CONCEPTUAL DESIGN**

Figure 5.1 provides a graphical representation of the baseline STA 2 inflow data for the 10-year period record and Figure 5.2 shows the corresponding phosphorus concentrations for the same time period. The average flow is equal to 1,424-acre – feet (464 million gallons per day) of water per day. Also shown on Figure 5.1 are the mean plus 1, 2, and 3 standard deviations of the flow data, respectively. The tabular summary of this data, presented in Table 5.1, shows that the mean plus two standard deviations of flow data represents approximately 97 percent of the total volume of water and 91 percent of the total mass of phosphorus for the entire period of record. The conceptual design flow and P mass for the full-scale MF application include the mean plus two standard deviations of baseline flow. Peak flows above mean plus two standard deviations were eliminated from consideration primarily due to current EAA basin reductions that have been observed since the establishment of the BMP program. For example, water years 1996 and 1997 showed EAA basin-wide total phosphorus load reductions of 68 percent and 50 percent, respectively compared to the baseline period of record. These recent basin-wide results are more than double the 25 percent reduction factored into the STA 2 baseline period of record data.

Figure 5.3 provides the graph of the estimated Post-STA 2 effluent flow for the 10-year period of record. Figure 5.4 shows the corresponding phosphorus concentration values for this same time period. The average Post-STA flow is equal to 536-acre – feet per day (175 million gallons per day). Figure 5.3 also shows the mean flow plus one, two and three standard deviations, respectively. As shown in Table 5.2, the calculated mean plus two standard deviations Post-STA 2 flow is equal to 2,218-acre - feet per day or 723 million gallons per day. This represents 90 percent of the total 10-year baseline period flow and 84 percent of the total 10 year P mass. For the reasons discussed above for the Post-BMP scenario, the conceptual design flow for the full-scale MF application includes the mean plus two standard deviations of the STA 2 period of record data.

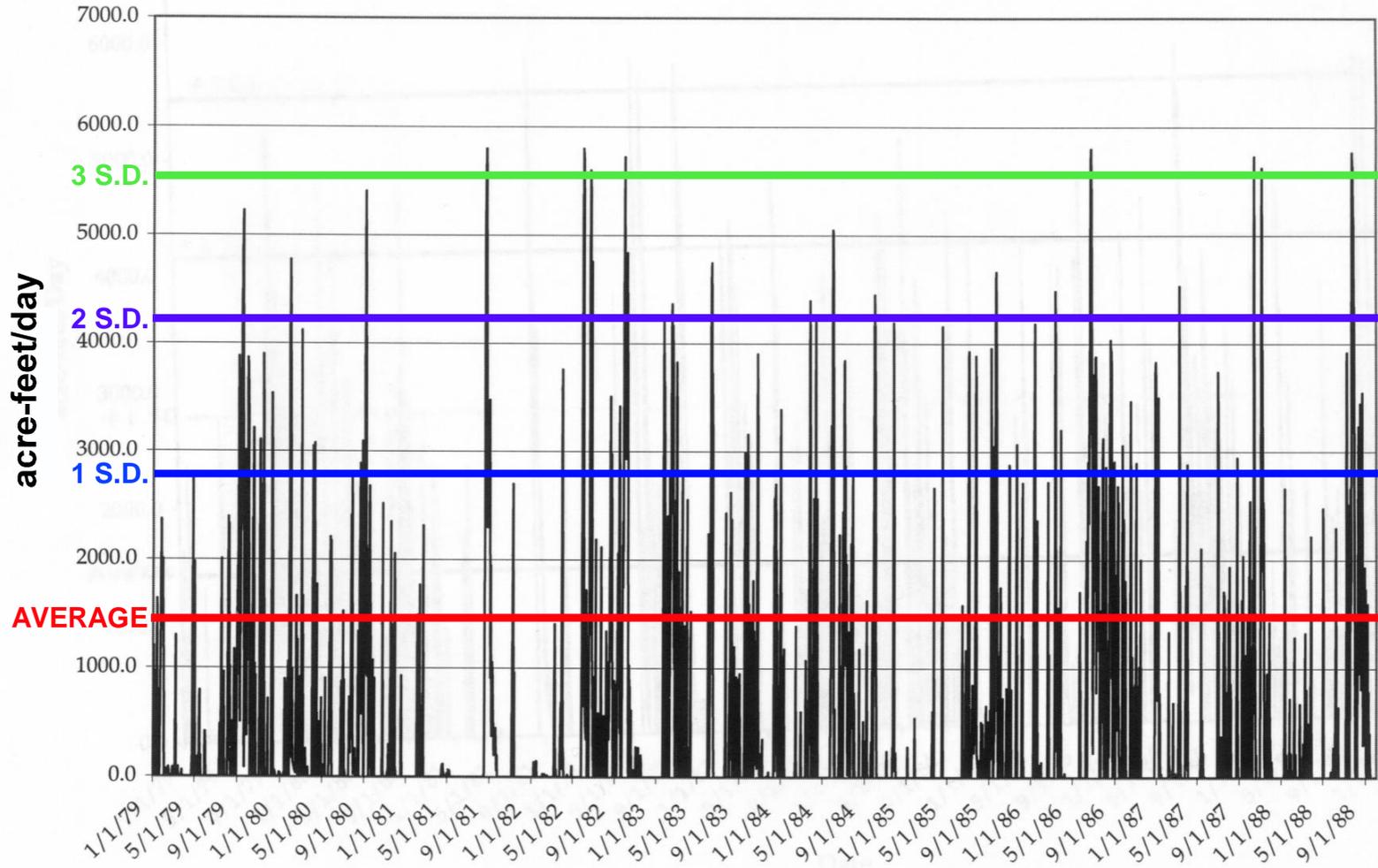


figure .1

BA ELINE TA INFLOW ( O TBM ) DATA

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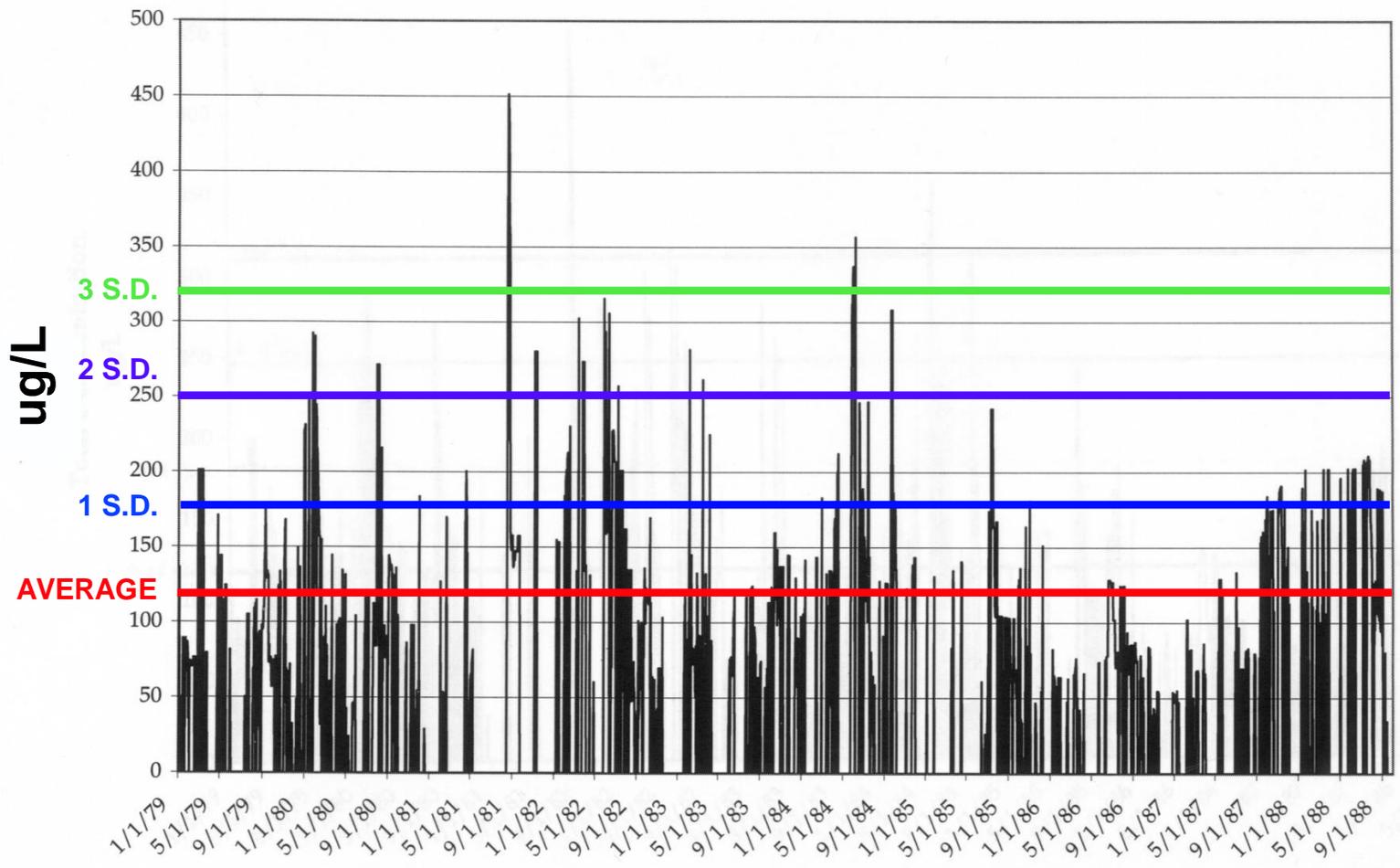


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BA ELINE TA INFLOW ( O TBM ) TOTAL  
HO HORU CONCENTRATION DATA

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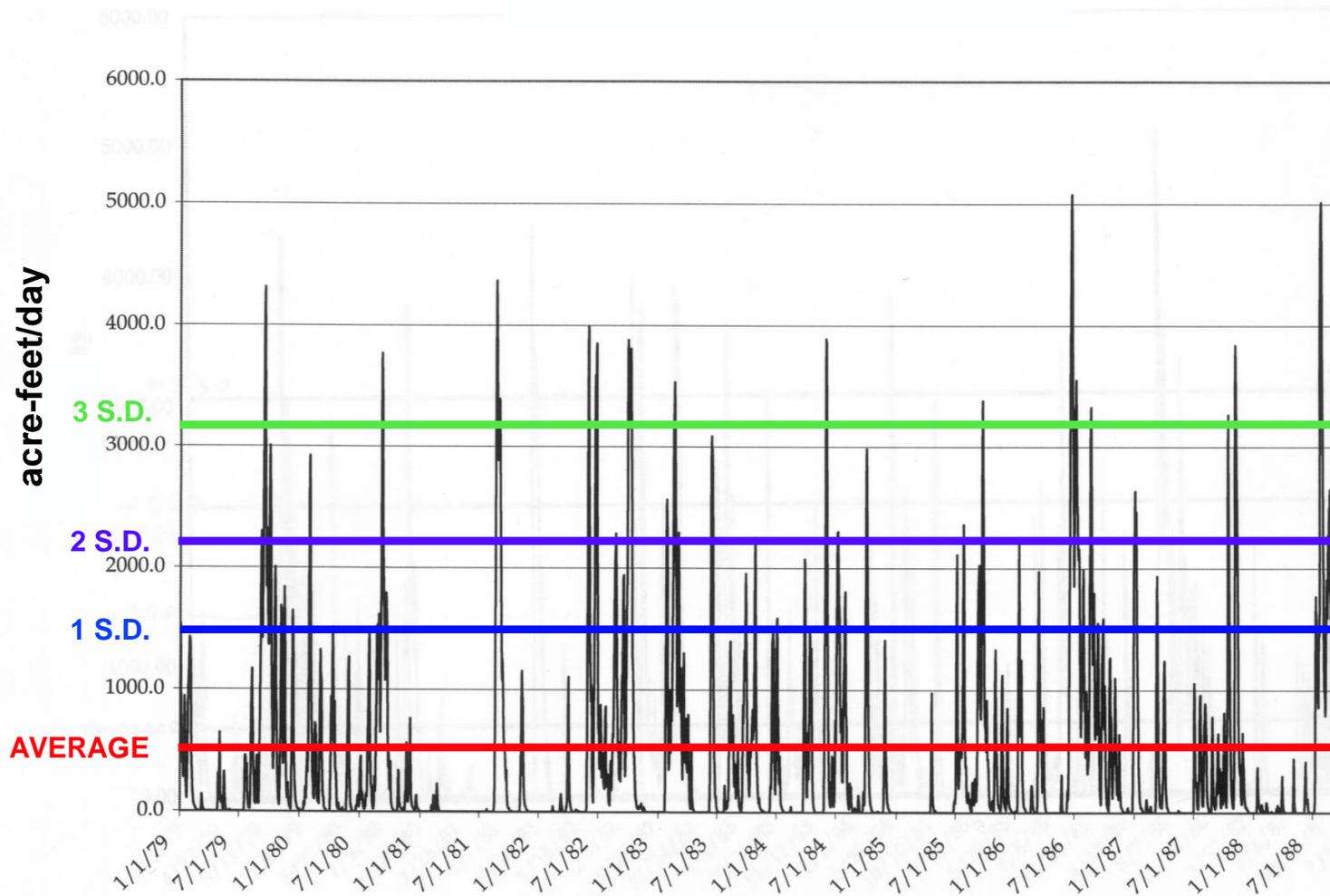


figure .3

E TIMATED BA ELINE TA EFFLUENT FLOW ( O T TA) DATA

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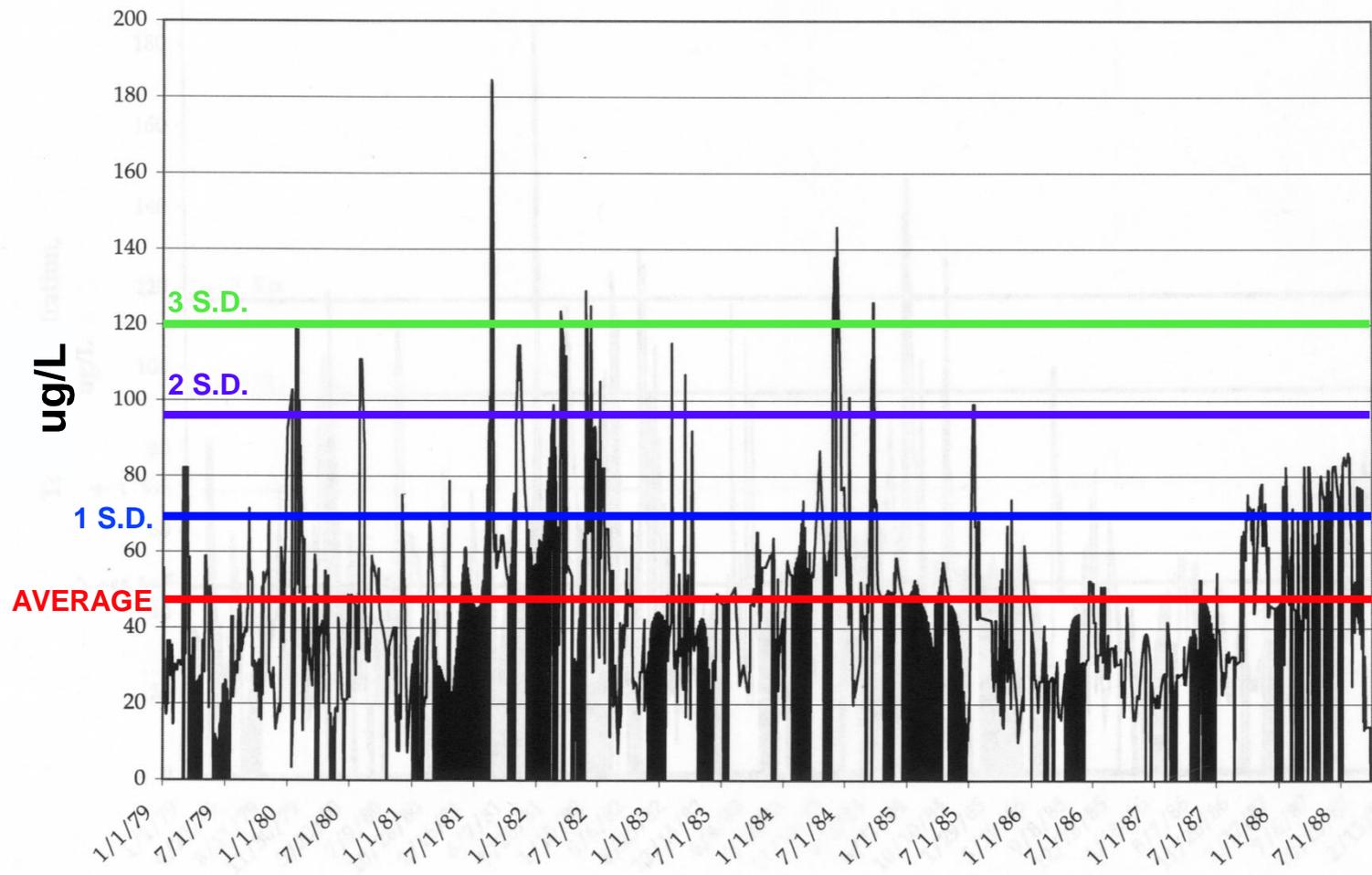


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 TOTAL HO HORU CONCENTRATION DATA

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**TABLE 5.1**  
**POST BMP ANALYSIS OF 10 YEAR BASELINE FLOWS AND**  
**PHOSPHORUS CONCENTRATIONS**

	<b>Flow</b>		<b>Total Phosphorus Concentration µg/L</b>	<b>% of Total 10 Year Event</b>	
	<b>acre-feet per day</b>	<b>million gallons per day</b>		<b>Flow Volume</b>	<b>P Mass</b>
Average	1424	464	118		
+ 1 Standard Deviation	2787	908	182	87%	76%
+ 2 Standard Deviation	4151	1353	247	97%	91%
+ 3 Standard Deviation	5515	1797	311	99.8%	98%
Minimum	0.3	0.1	8		
Maximum	5800	1890	452		

Notes:

1. Baseline data for STA-2 flows and phosphorus concentrations -- adjusted for BMP effects; periods of record = 3651 days; number of flow days = 1245 or 35%
2. Total 10 year flow =  $1.77 \times 10^6$  acre-feet ( $5.77 \times 10^5$  mgal); Total 10 year mass =  $2.68 \times 10^5$  kg ( $5.90 \times 10^5$  lb)

**TABLE 5.2**  
**POST STA ANALYSIS OF 10 YEAR BASELINE FLOWS AND**  
**PHOSPHORUS CONCENTRATIONS**

	<b>Flow</b>		<b>Total Phosphorus Concentration µg/L</b>	<b>% of Total 10 Year Event</b>	
	<b>acre-feet per day</b>	<b>million gallons per day</b>		<b>Flow Volume</b>	<b>P Mass</b>
Average	536	175	46		
+ 1 Standard Deviation	1377	449	70	76%	66%
+ 2 Standard Deviation	2218	723	93	90%	84%
+ 3 Standard Deviation	3059	997	117	97%	93%
Minimum	0.1	0.03	3		
Maximum	5080	1655	185		

Notes:

1. Baseline data calculated for Post STA-2 flows and phosphorus concentrations; periods of record = 3651 days; number of flow days = 2859 or 80%
2. Total 10 year flow =  $1.53 \times 10^6$  acre-feet ( $5.00 \times 10^5$  mgal); Total 10 year mass =  $9.45 \times 10^4$  kg ( $2.08 \times 10^5$  lb)

## **5.2.2 FULL-SCALE CONCEPTUAL DESIGN FUNDAMENTAL APPROACH**

Water treatment technologies generally operate best (e.g., consistently produce the highest quality effluent stream) within a relatively narrow range of influent flows. The wide fluctuations of flows associated with the EAA stormwaters will require full-scale conventional water treatment systems to be coupled with flow equalization basins (FEB) in order to store runoff from peak rainfall events until they can be adequately processed. A debate has already begun regarding technology nomenclature and whether an equalization basin is actually another term for an STA. No attempt to resolve this debate will be made herein. For a technology such as MF, flow equalization is an essential element in effectively treating volumes of surface waters significantly impacted by rainfall. For the purposes of this report, a flow equalization basin coupled with an MF treatment system is not synonymous to a post STA treatment scenario. The size of the treatment system relative to that of the equalization basin can vary significantly depending upon the extent of flow variance and the ability of the treatment system to accommodate peak hydraulic loadings. In order to determine optimal combinations of full-scale MF systems relative to that of the associated equalization basins, a simple computer program was developed to calculate numerous treatment system/equalization basin sizing scenarios. The input assumptions for the computer program included:

### 1. Post--BMP Treatment System:

- the maximum depth of an equalization basin would be 8 feet;
- the full-scale MF system can operate at a peak load of 25 percent greater than its average daily design flow rate for limited (i.e., less than 25 percent of the operating days) time periods;
- the MF technology coupled with coagulant addition will produce an average filtrate total phosphorus concentration of at least 0.008 mg/L as P. As discussed in Section 4, MF Treatment coupled with chemical coagulant addition can routinely achieve a value of less than 0.004 mg/L total phosphorus. Using a design value of 0.008 mg/L is considered to be conservative as actual full-scale system will probably produce filtrates with lower Total P results;
- raw untreated water would be blended with the MF effluent to achieve a discharge concentration of 0.01 mg/L as P; and
- the blended effluent would meet the interim effluent requirement of 0.01 mg/L as P the majority of the time but the design allows for influent

flows associated with 10 percent of the total influent P mass to exceed this treatment target.

2. Post-STA Treatment System:

- incoming flow would be equalized within STA 2, requiring up to a maximum of 2 feet of storage (a total of 12,860-acre – feet) within the STA than currently planned;
- the full-scale MF system can operate at a peak load of 25 percent greater than its average daily design flow rate for limited (i.e., less than 25 percent of the operating days) time periods;
- the MF technology coupled with chemical coagulation will produce an average filtrate total phosphorus concentration of 0.008 mg/L as P. Portions STA effluents that have not been processed through MF facility would be blended with the MF effluent to achieve a discharge concentration of 0.01 mg/L as P; and
- the blended effluent would meet the interim effluent requirement of 0.01 mg/L as P the majority of the time but the design allows for influent flows associated with 10 percent of the total influent P mass to exceed this treatment target.

**5.2.3 POST-BMP FULL SCALE MF TREATMENT  
SYSTEM CONCEPTUAL DESIGN**

Numerous combinations of FEB size relative to MF treatment size were processed by the computer program and Table 5.3 provides a summary of the effect of varying the size of the FEB upon the blended phosphorus effluent quality. Using a target blended total phosphorus concentration of 10 ppb (0.01 mg/L) and a MF system size of 200 mgd (average design daily flow), a 1,000-acre flow equalization basin would treat 76 percent of the total incoming phosphorus mass to the targeted effluent level. Increasing the size of the FEB to 3,000 acres would result in 88 percent of the total influent phosphorus mass being processed and achieving the targeted 10 ppb effluent goal. A 3,456-acre FEB would result in a blended final effluent of 10 ppb with all but 10 percent of the total phosphorus mass achieving the targeted effluent phosphorus concentration.

The full-scale MF design was based upon the combination of a 3,456-acre (3,500 acre used in the design) equalization basin coupled with a 200 mgd MF treatment system. The average depth of the water in the equalization basin would be equal to 2.4 feet, using the required 10-year period of record flow data. Using the STA–2 10-year period

**TABLE 5.3**

**F E B SIZE VERSUS EFFLUENT PHOSPHORUS QUALITY FOR POST BMP WATERS**

<b>Target "P" Final Blended Effluent Concentration (µg/L)</b>	<b>MF System</b>		<b>F E B <sup>1</sup> Size (acres)</b>	<b>Phosphorus Mass Exceeding Target "P" (kg) (% of Total)</b>		<b>MF System</b>			
	<b>Average Design Flow (MGD)</b>	<b>Peak Design Flow (MGD)</b>				<b>Operating</b>		<b>Peak Performance</b>	
						<b>Days</b>	<b>% of Event</b>	<b>Days</b>	<b>% of Operations</b>
10	200	250	1000	58916	24%	1969	55%	470	24%
			3000	29118	12%	2339	66%	271	12%
			3456	24460	10% <sup>2</sup>	2388	67%	251	11%
20	200	250	1000	37644	15%	1969	55%	470	24%
			1742	24358	10%	2158	61%	353	16%
			3000	7964	3%	2339	66%	271	12%

Notes:

<sup>1</sup>Using FEB of 8 feet effective depth

<sup>2</sup>Average blended Total P concentration of 55 ppb will occur during periods of exceedance

of record data, this treatment system design would produce a 10 ppb blended phosphorus effluent on all but 10 percent of the total incoming phosphorus. The system would operate at a maximum hydraulic design capacity of 250 mgd a total of 11 percent of the time and, on average, the facility would operate a total of 67 percent of the time defined in the entire 9.75-year period of record.

Table 5.4 presents the detailed conceptual design criteria developed for the Post-BMP MF treatment system for both Memcor and Zenon facility designs. The information used to develop these designs were obtained from data provided by Memcor and Zenon Corporations coupled with CRA design experience. Provided in Table 5.4 is a summary of the feed characteristics to the system, FEB dimensions, MF equipment criteria (e.g., number of membranes, design GFD, etc.), and description of solids handling facilities and chemical feed systems.

The process flow diagram for the full-scale MF application is shown on Figure 5.5. Post-BMP water would enter the 3,500-acre FEB and would then be pumped to the MF treatment system. Coarse screen filtering would first remove large particles that could damage or blind (i.e., significantly shorten the effective run times) the membranes. Coagulant would then be fed into system. Ferric chloride is recommended for use as the primary coagulant at an average dose of 8 mg/L as Fe. Even though ferric chloride and alum were rated approximately equal in their ability to remove phosphorus, the selection of ferric chloride was based upon the superior membrane performance (i.e., observed longer run times between required chemical cleanings) and also based upon prevalent environmental concerns regarding aluminum toxicity.

Backwash solids and blowdown from the coarse screen will be discharged to an onsite storage lagoon (35-acre basin for the Memcor and 15 for the Zenon). Supernatant overflow from the solids storage area would be returned to the MF treatment system for filtration. Settled solids in the lagoon could either be collected and disposed of on adjacent agricultural lands for use as a soil amendment, or they could be managed onsite by use of a dedicated land application facility. The estimated required area for this dedicated solids disposal area is 120 acres and is based upon an annual solids loading criterion of 28 tons of dry solids per acre.

Flux restoration will be accomplished by cleaning the Memcor membranes with a solution of citric acid on the average every 2 weeks of continuous membrane operation. The Zenon membranes would be cleaned with a combination of citric acid and chlorine. These cleaning solutions were designed to be discharged to the onsite storage lagoon along with the backwash solids. If the chlorine usage becomes an identified

**TABLE 5.4**  
**POST BMP MICROFILTRATION TREATMENT SYSTEM**  
**CONCEPTUAL DESIGN CRITERIA**

<i><b>CRITERIA</b></i>	<i><b>MEMCOR</b></i>	<i><b>ZENON</b></i>
<b>Feed Characteristics</b>		
Mean Influent Flow, Million Gallons per Day	464	464
Maximum Influent Flow, Million Gallons per Day	1353	1353
Mean Total Phosphorus Concentration, mg/L as P	118	118
Maximum Total Phosphorus Concentration, mg/L as P	247	247
Temperature Range, Degrees Centigrade	20 -25	20 - 25
<b>Flow Equalization Basin</b>		
Total Volume, Million Gallons	9100	9100
Total Volume, Acre – Feet	28000	28000
Surface Area, Acres	3500	3500
Total Effective Depth, Feet	8	8
<b>Equipment Criteria</b>		
Average Design Flow Rate, MGD,	200	200
Peak Design Flow Rate, MGD	250	250
Percent Time at Peak Flow Rate	< 25	< 25
Average Design Flux Rate, (GFD)	40	40
Peak Design Flux Rate, (GFD)	50	50
Module Membrane Surface Area, Square Feet	161	500
Effective Average Flow Rate Per Module, GPM	4.48	13.9
MF Modules Required, Quantity	30,960	10000
MF Treatment Unit Selected	90M10C	Zenon 3 Gen.
Number of Membranes Per Unit, Quantity	90	8
Number of Units Required, Quantity	344	1250
<b>Air Requirements</b>		
Compressed Air Flow Rate, CFM	17494	12495
Storage Pressure, psi	120	45

<sup>1</sup> For Sodium Hypochlorite: 1,320 gallons used per clean; Total of 10,560 gallons used per year; Spent Solution equal to 235,000 gallons per entire system cleaning.

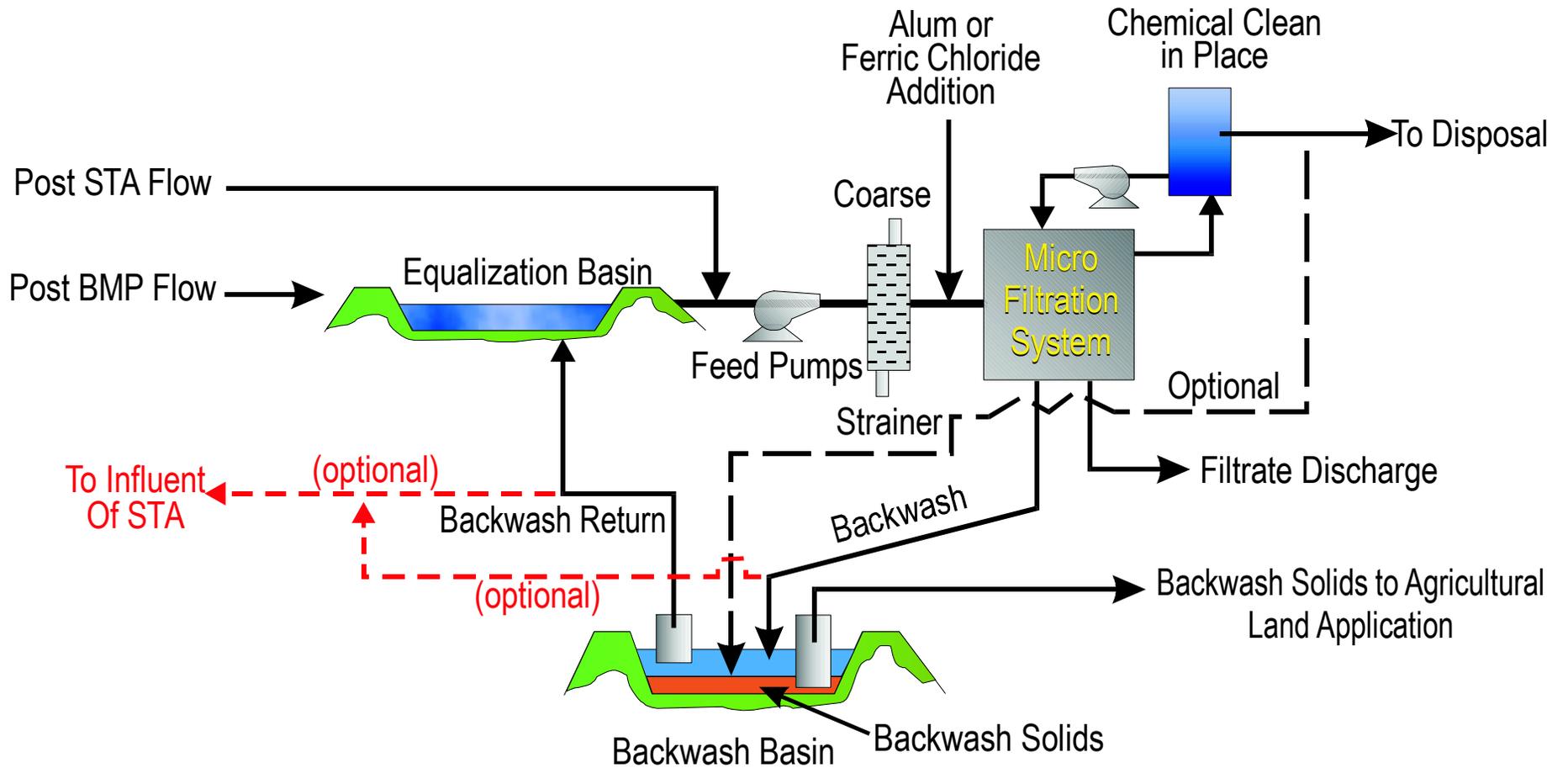


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**TABLE 5.4**  
**POST BMP MICROFILTRATION TREATMENT SYSTEM**  
**CONCEPTUAL DESIGN CRITERIA**

<b>CRITERIA</b>	<b>MEMCOR</b>	<b>ZENON</b>
<b>Backwash Requirements/Solids Generation</b>		
Backwash Frequency, minutes	20	7.5
Backwash Volume, per MGD Treated, gallons	122000	50000 (Bleed Volume)
Total Backwash Volume per Day, MGD	24.4	10 (Bleed Volume)
Volume of Concentrated Solids, Gallons Per MGD Treated	480	480
Concentrated Solids Produced Per Day, Gallons	96000	96000
Solids Content of Concentrated Solids, %	3.0	3.0
Volume of Supernatant Returned To Treatment, MGD	24.3	10
Average Concentration of Solids in Supernatant, TSS mg/L	60	60
Holding Capacity of Solids Retention Basin, Days	3	3
Solids Retention Basin Volume, Million Gallons	91.5	37.5
Area of Solids Retention Basin, Acres	35	15
Solids Retention Basin Effective Depth, Feet	8	8
<b>Coarse Screen System</b>		
Effective Screen Size, Microns	400	400
Peak Filtration Flow rate, MGD	250	250
Size of Coarse Screen Strainer, inches	30	30
Capacity of each Coarse Strainer, MGD	20	20
Number of Strainers (at Peak Flow)	13	13
Backwash Frequency, hours	2	2
Backwash Volume Per Screen, GPM	625	625
Backwash Duration, minutes	1.5	1.5
Total Backwash Volume per Day, Gallons	146000	146000
Average Suspended Solids Content, mg/L	400	400
<b>Chemical Feed</b>		
Coagulant Type	Ferric Sulfate	Ferric Sulfate
Maximum Coagulant Dosage, mg/L as Iron	20	20

<sup>1</sup> For Sodium Hypochlorite: 1,320 gallons used per clean; Total of 10,560 gallons used per year; Spent Solution equal to 235,000 gallons per entire system cleaning.

**TABLE 5.4**  
**POST BMP MICROFILTRATION TREATMENT SYSTEM**  
**CONCEPTUAL DESIGN CRITERIA**

<b>CRITERIA</b>	<b>MEMCOR</b>	<b>ZENON</b>
Average Coagulant Dosage, mg/L as Iron	8	8
Total Coagulant Feed at Average Design Flow, lb. Iron/day	13344	13344
Ferric Sulfate Usage per Day (12% Iron), Gallons	13344	13344
Ferric Sulfate Usage per Day At Peak Flow, Gallons	16680	16680
<b>Chemical Cleaning</b>		
Cleaning Frequency, days between cleaning	14	14
Total Time Plant Operating, Percent	67	67
Chemical Cleans Per Year	18	18
Chemical Cleaning Solution,	Citric Acid	Citric Acid/Sodium Hypochlorite <sup>1</sup>
Quantity Citric Acid Used Per Module Per Clean, Pounds	1.3	4.9
Number of Modules	30960	10000
Solution Reuses, number	1	1/0
Citric Acid Required Per Year, Pounds	362232	244450
Citric Acid Required Per Year, Tons	181	122
Spent Solution Generated Per Entire System Cleaning, Gallons	775,000	117,400
<b>Effluent Quality</b>		
Permeate Total Phosphorus Concentration, mg/L as P	8	8
Target Effluent Total P (Permeate plus bypass), mg/L as P	10	10

<sup>1</sup> For Sodium Hypochlorite: 1,320 gallons used per clean; Total of 10,560 gallons used per year; Spent Solution equal to 235,000 gallons per entire system cleaning.

environmental concern, a dechlorinating agent (i.e., sodium sulfite) could be added to the chemical cleaning blowdown stream or substitution of hydrogen peroxide for chlorine could also be explored.

#### **5.2.4 POST-STA FULL-SCALE MF TREATMENT SYSTEM CONCEPTUAL DESIGN**

In developing the full-scale MF treatment system conceptual design for the Post-STA application, flow equalization was assumed to occur entirely within STA 2 by increasing the normal operating level by a maximum of 2 feet. This 2 feet of additional storage in the STA would result in a total of 12,860-acre – feet of water storage beyond the original STA 2 design. Table 5.5 provides the computer program output of various combinations of MF treatment facility size and mass of phosphorus treated. The treatment scenarios shown in Table 5.5 were computed using the STA 2 to equalize treatment system influent flows. A 200 mgd MF treatment facility would treat 93 percent of the total influent phosphorus mass to the targeted discharge level of 0.01 mg/L as P. The somewhat smaller facility of 175 (rounded up from the 172 mgd figure shown in Table 5.5) mgd would treat 90 percent of the influent phosphorus mass to the targeted effluent level.

The full-scale Post-STA design was based upon an MF treatment system average design flow of 175 mgd and use of STA-2 as the flow equalization basin. Under this scenario, the full-scale system would produce a 10 ppb blended phosphorus effluent the majority of the time with 10 percent of the phosphorus mass contained in STA effluent waters exceeding the 10 ppb target level. The system would operate at the maximum hydraulic design capacity of 215 mgd a total of 15 percent of the time and, on average, the facility would operate a total of 82 percent of the entire 9.75 year period of record. Using the STA 2 to equalize flows would result in an average increase of 7.2 inches to the STA 2 operating level. Since the plan of operation for STA 2 has not been prepared to date, it is difficult to assess the impact of this additional water upon the STA 2 operation. However, since the conceptual plan for STA 2 called for an operating range of 0.5 to 4 feet, an additional 7.2 inches may be well within design tolerance factors.

Detailed conceptual design criteria for the Post-STA Microfiltration treatment system is provided in Table 5.6 for both the Memcor and the Zenon designs. Included in Table 5.6 is a summary of the influent feed characteristics, MF equipment criteria (number of required membranes, design flux rates, etc.) and specifications for solids handling equipment.

**TABLE 5.5**

**MF TREATMENT SYSTEM SIZE VERSUS EFFLUENT PHOSPHORUS LEVELS FOR POST STA WATERS**

<b>Target "P" Final Blended Effluent Concentration (µg/L)</b>	<b>MF System</b>		<b>Phosphorus Mass Exceeding Target "P" (kg) (% of Total)</b>		<b>MF System</b>			
	<b>Average Design Flow (MGD)</b>	<b>Peak Design Flow (MGD)</b>			<b>Operating</b>		<b>Peak Performance</b>	
					<b>Days</b>	<b>% of Event</b>	<b>Days</b>	<b>% of Operations</b>
10	200	250	5700	7%	2884	81%	394	14%
10	172	215	7900	10% <sup>1</sup>	2919	82%	451	15%
20	58	73	7900	10%	3276	92%	1019	31%

Notes:

Using 12,860 acre-feet additional storage capacity beyond STA design

<sup>1</sup>Average blended concentrations of 28 ppb Total P will occur during periods of exceedance

TABLE 5.6

**POST STA MICROFILTRATION TREATMENT SYSTEM  
CONCEPTUAL DESIGN CRITERIA**

<i><b>CRITERIA</b></i>	<i><b>MEMCOR</b></i>	<i><b>ZENON</b></i>
<b>Feed Characteristics</b>		
Mean Influent Flow, Million Gallons per Day	175	175
Maximum Influent Flow, Million Gallons per Day	723	723
Mean Total Phosphorus Concentration, mg/L as P	46	46
Maximum Total Phosphorus Concentration, mg/L as P	93	93
Temperature Range, Degrees Centigrade	20 -25	20 - 25
<b>Flow Equalization <sup>1</sup></b>		
Total Volume, Million Gallons	4180	4180
Total Volume, Acre - Feet	12,860	12,860
Surface Area, Acres <sup>2</sup>	6,430	6,430
Total Effective Depth, Feet	2	2
<b>Equipment Criteria</b>		
Average Design Flow Rate, MGD,	175	175
Peak Design Flow Rate, MGD	215	215
Percent Time at Peak Flow Rate	< 25	< 25
Average Design Flux Rate, (GFD)	40	40
Peak Design Flux Rate, (GFD)	50	50
Module Membrane Surface Area, Square Feet	161	500
Effective Average Flow Rate Per Module, GPM	4.48	13.9
MF Modules Required, Quantity	27,090	8,750
MF Treatment Unit Selected	90M10C	Zenon 3 Gen.
Number of Membranes Per Unit, Quantity	90	8
Number of Units Required, Quantity	301	1095
<b>Air Requirements</b>		
Compressed Air Flow Rate, CFM	15400	10935
Storage Pressure, psi	120	45

TABLE 5.6

**POST STA MICROFILTRATION TREATMENT SYSTEM  
CONCEPTUAL DESIGN CRITERIA**

<i><b>CRITERIA</b></i>	<i><b>MEMCOR</b></i>	<i><b>ZENON</b></i>
<b>Backwash Requirements/Solids Generation</b>		
Backwash Frequency, minutes	20	7.5
Backwash Volume, per MGD Treated, gallons	122000	50000 (Bleed Volume)
Total Backwash Volume per Day, MGD	21.4	8.8 (Bleed Volume)
Volume of Concentrated Solids, Gallons Per MGD Treated	480	480
Concentrated Solids Produced Per Day, Gallons	84,000	84,000
Solids Content of Concentrated Solids, %	3.0	3.0
Volume of Supernatant Returned To Treatment, MGD	21.3	8.7
Average Concentration of Solids in Supernatant, TSS mg/L	60	60
Holding Capacity of Solids Retention Basin, Days	3	3
Solids Retention Basin Volume, Million Gallons	79	32
Area of Solids Retention Basin, Acres	30	15
Solids Retention Basin Effective Depth, Feet	8	8
<b>Coarse Screen System</b>		
Effective Screen Size, Microns	400	400
Peak Filtration Flow rate, MGD	215	215
Size of Coarse Screen Strainer, inches	30	30
Capacity of each Coarse Strainer, MGD	20	20
Number of Strainers (at Peak Flow)	11	11
Backwash Frequency, hours	2	2
Backwash Volume Per Screen, GPM	625	625
Backwash Duration, minutes	1.5	1.5
Total Backwash Volume per Day, Gallons	124,000	124,000
Average Suspended Solids Content, mg/L	400	400

TABLE 5.6

**POST STA MICROFILTRATION TREATMENT SYSTEM  
CONCEPTUAL DESIGN CRITERIA**

<b>CRITERIA</b>	<b>MEMCOR</b>	<b>ZENON</b>
<b>Chemical Feed</b>		
Coagulant Type	Ferric Sulfate	Ferric Sulfate
Maximum Coagulant Dosage, mg/L as Iron	15	15
Average Coagulant Dosage, mg/L as Iron	3	3
Total Coagulant Feed at Average Design Flow, lb. Iron/day	4,380	4,380
Ferric Sulfate Usage per Day (12 % Iron), Gallons	4,380	4,380
Ferric Sulfate Usage per Day At Peak Flow, Gallons	5,380	5,380
<b>Chemical Cleaning</b>		
Cleaning Frequency, days between cleaning	21	21
Total Time Plant Operating, Percent	82	82
Chemical Cleans Per Year	14	14
Chemical Cleaning Solution,	Citric Acid	Citric Acid/Sodium Hypochlorite <sup>3</sup>
Quantity Citric Acid Used Per Module Per Clean, Pounds	1.3	4.9
Number of Modules	27,090	8750
Solution Reuses, number	1	1
Citric Acid Required Per Year, Pounds	246,500	128,400
Citric Acid Required Per Year, Tons	123	64
Spent Solution Generated Per Entire System Cleaning, Gallons	678,000	103,000
<b>Effluent Quality</b>		
Permeate Total Phosphorus Concentration, mg/L as P	8	8
Target Effluent Total P (Permeate plus bypass), mg/L as P	10	10

The conceptual design schematic diagram for the Post-STA Microfiltration treatment system within the STA-2 setting is provided on Figure 5.6. More specific details for the location of a Zenon system with the discharge canal are shown on Figure 5.7. Effluent flow from STA 2 will be pumped, via the G-335 pump station, to the coarse screen prior to entering the membrane filtration units. An average concentration of 3 mg/L of ferric chloride as Fe will be fed to the feedwaters of the MF treatment system. Backwash solids and blowdown from the coarse screen will be discharged to an onsite storage lagoon. This lagoon is sized at 35 acres for the Memcor design and 15 acres for the Zenon. Supernatant overflow from the solids storage facility will be returned to the headworks of the MF treatment system. Several options exist for handling the settled solids generated by the filtration process. The solids could be pumped back to the influent feed line to the STA 2 and discharged into the upstream portion of the stormwater treatment area. The settled solids could also be managed onsite by use of a dedicated land application facility. The estimated land requirement for this dedicated solids disposal area would be equal to 90 acres for either the Memcor or Zenon designs.

Flux restoration would be the same as described for the Post-BMP scenario with the Memcor using a solution of citric acid and the Zenon facility requiring a combination of citric acid and chlorine.

### **5.3 PRELIMINARY COST ESTIMATE FOR THE FULL – SCALE MF DESIGN**

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Cost estimates were prepared for microfiltration (MF) treatment plants treating Post-BMP and Post-STA waters. Table 5.7 includes a summary of the costs for a 200-mgd Post-BMP MF treatment plant and a 175-mgd Post-STA MF treatment plant. Each scenario includes capital, operation and maintenance (O&M), replacement, and salvage costs for both the Memcor and Zenon MF units. A 50 percent present worth cost was then calculated based on a using a net discount rate of 4 percent. The 10-year period of record (1979-1988) flow and phosphorus data was used to calculate the present worth for each scenario per million gallons of treated water (\$/million gallons treated) and per pound of phosphorus removed (\$/pound of P removed).

Explanations of the values used in the basis of design and cost estimates are provided in Tables 5.8 and 5.9, respectively.

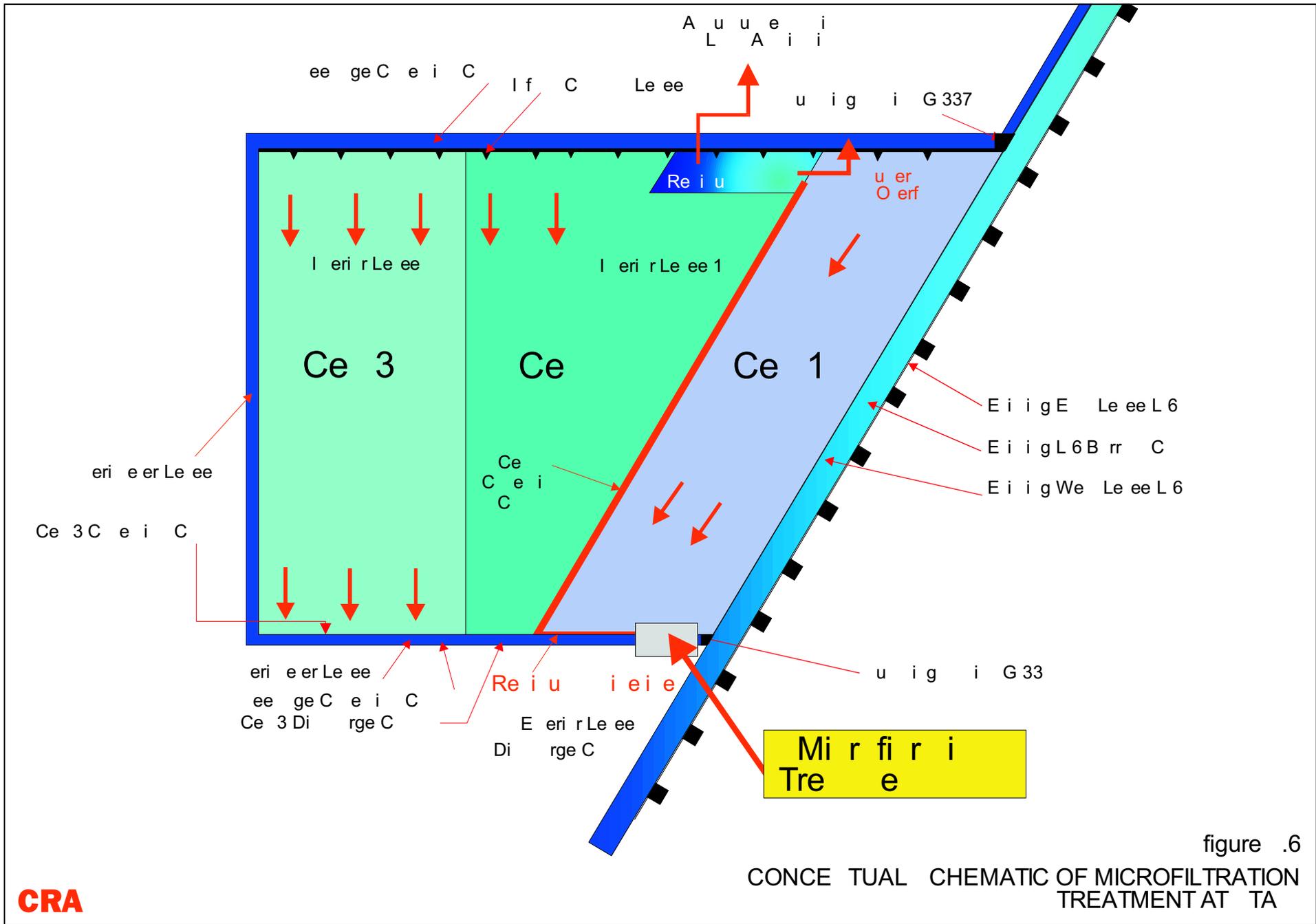


figure .6

CONCEPTUAL SCHEMATIC OF MICROFILTRATION TREATMENT AT TA

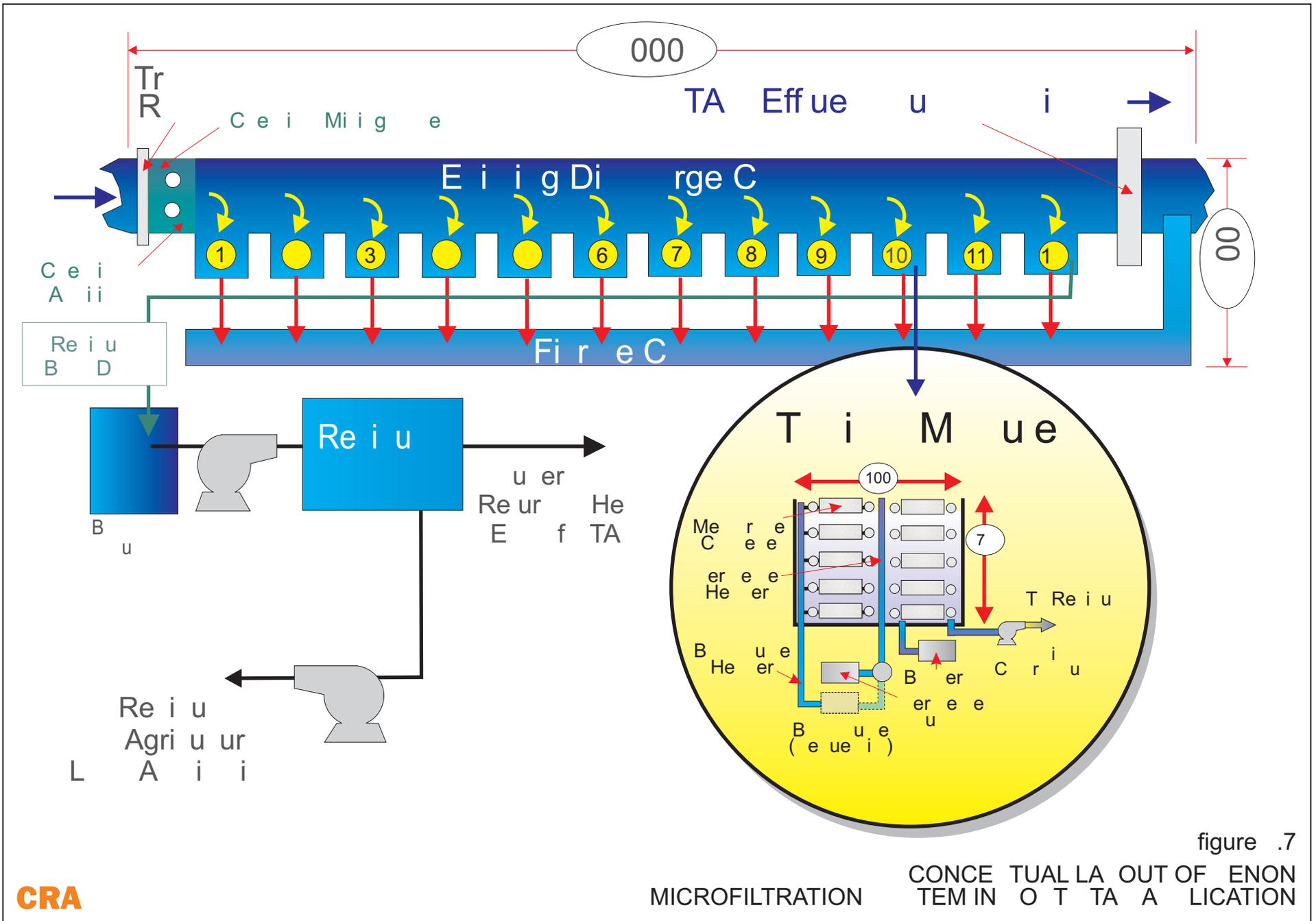


figure .7

MICROFILTRATION CONCE TUAL LA OUT OF ENON TEM IN O T TA A LICATION

TABLE 5.7

## COST ESTIMATE FOR MICROFILTRATION

	<i>POST BMP</i>		<i>POST STA</i>	
	<i>Memcor</i>	<i>Zenon</i>	<i>Memcor</i>	<i>Zenon</i>
<b>Basis of Design</b>				
Influent PS capacity, mgd	1355	1355	0	0
Influent PS average flow, mgd	465	465	0	0
FEB area, acres	3500	3500	0	0
Treatment plant influent PS capacity, mgd	250	250	215	215
Treatment Plant influent PS average flow, mgd	200	200	175	175
Treatment plant land area, acres	40	25	35	20
Sludge disposal area, acres	120	120	95	95
Effluent PS capacity, mgd	1355	1355	0	0
Effluent PS average flow, mgd	465	465	0	0
Total land area, acres	4026	4010	143	127
<b>Capital Costs, \$ million</b>				
Influent pumping station	18.9	18.9	0.0	0.0
FEB	29.7	29.7	0.0	0.0
FEB seepage pump station	0.8	0.8	0.0	0.0
Treatment plant influent pump station	6.0	0.0	5.3	0.0
Treatment plant	108.6	96.2	95.0	84.2
Sludge treatment and disposal	1.5	1.5	1.5	1.5
Effluent pump station	18.9	18.9	0.0	0.0
Subtotal	184.4	166.1	101.8	85.7
Construction contingencies (20 percent)	36.9	33.2	20.4	17.1
Subtotal, construction costs	221.3	199.3	122.1	102.8
Engineering (15 percent)	33.2	29.9	18.3	15.4
Land purchase - FEB	13.9	13.9	0.0	0.0
Land purchase - treatment plant	0.2	0.1	0.1	0.1
Land purchase - sludge disposal	0.5	0.5	0.4	0.4
Total Capital Cost	269.0	243.6	141.0	118.7
Present Worth - Capital Cost	269.0	243.6	141.0	118.7

TABLE 5.7

## COST ESTIMATE FOR MICROFILTRATION

	<i>POST BMP</i>		<i>POST STA</i>	
	<i>Memcor</i>	<i>Zenon</i>	<i>Memcor</i>	<i>Zenon</i>
<b>O&amp;M Costs, \$ million/yr</b>				
Influent pumping station	1.3	1.3	0.0	0.0
FEB	0.2	0.2	0.0	0.0
FEB seepage pump station	0.2	0.2	0.0	0.0
Treatment plant influent pump station	0.6	0.0	0.5	0.0
Chemicals	1.8	1.7	0.7	0.6
Sludge treatment and disposal	0.2	0.2	0.2	0.2
Labor, electric, membrane replacement	6.0	5.4	5.5	5.0
Treatment plant sampling and monitoring	0.3	0.3	0.2	0.2
Effluent pump station	1.3	1.3	0.0	0.0
Total Annual O&M Cost	11.9	10.6	7.1	5.9
Present Worth - Annual O&M Cost	255.5	227.8	151.8	127.3
<b>Present Worth - Replacement Costs, \$ million</b>				
Total Present Worth - Replacement Costs	24.2	21.9	12.7	10.7
<b>Salvage Value, \$ million</b>				
Net Salvage value	32.3	29.2	16.9	14.2
Present Worth - Salvage Value	4.5	4.1	2.4	2.0
<b>50 - Year Present Worth, \$ million</b>				
Capital Cost	269.0	243.6	141.0	118.7
O&M Cost	255.5	227.8	151.8	127.3
Replacement Cost	24.2	21.9	12.7	10.7
Salvage Value	4.5	4.1	2.4	2.0
Total	553.2	497.5	307.8	258.7
Present worth, \$/million gallons treated	196.9	177.0	136.8	115.0
Present worth, \$/pound P removed	253.2	227.7	549.7	462.0

Notes:

<sup>1</sup> Treatment plant land area includes backwash basins (Post BMP: M=35 acres, Z=15 acres; Post STA: M = 30 acres, Z = 15acres)<sup>2</sup> Total replacement costs = 9% of total capital costs<sup>3</sup> Net salvage value = -12% of total capital costs

**TABLE 5.8**  
**SUMMARY OF BASIS OF DESIGN**

<b>Item No.</b>	<b>Description</b>	<b>Value Memcor</b>	<b>Value Zenon</b>	<b>Basis</b>
<b><u>POST BMP SCENARIO</u></b>				
1	Influent pump station capacity	1355 mgd	1355 mgd	Average flow + 2 SDs (10-yr record)
2	Influent pump station average flow	465 mgd	465 mgd	Average flow (10-yr record)
3	FEB area	3500 acres	3500 acres	Based on 10% bypass
4	Treatment plant capacity	250 mgd	250 mgd	average treatment plant flow * 1.25)
5	Treatment plant average flow	200 mgd	200 mgd	Value from stated FEB size and 10% bypass
6	Treatment plant land area	40 acres	25 acres	Footprint supplied by MF vendor, a 200 ft buffer zone and backwash basin
7	Sludge disposal area	120 acres	120 acres	Solids generated * application rate (28.4 tons/acre/yr)
8	Effluent pump station capacity	1355 mgd	1355 mgd	Average flow + 2 SDs (10-yr record)
9	Effluent pump station average flow	465 mgd	465 mgd	Average flow (10-yr record)
10	Total land area	4026 acres	4010 acres	(Sum of Item Nos. 3, 6, and 7) * 1.1 <i>additional 10% allowance for roads, etc.</i>
<b><u>POST STA SCENARIO</u></b>				
1	Influent pump station capacity			Not necessary for Post-STA scenario
2	Influent pump station average flow			Not necessary for Post-STA scenario
3	FEB area			Not necessary for Post-STA scenario
4	Treatment plant capacity	215 mgd	215 mgd	average treatment plant flow * 1.25)
5	Treatment plant average flow	175 mgd	175 mgd	Value from stated FEB size and 10% bypass
6	Treatment plant land area	35 acres	20 acres	Footprint supplied by MF vendor, a 200 ft buffer zone and backwash basin
7	Sludge disposal area	95 acres	95 acres	Solids generated * application rate (28.4 tons/acre/yr)
8	Effluent pump station capacity			Not necessary for Post-STA scenario
9	Effluent pump station average flow			Not necessary for Post-STA scenario
10	Total land area	143 acres	127 acres	(Sum of Item Nos. 6 and 7) * 1.1 <i>additional 10% allowance for roads, etc.</i>

**TABLE 5.9**  
**SUMMARY OF KEY COST ESTIMATION FACTORS**

**POST BMP SCENARIO**

Item No.	Description	Unit	Cost (\$/unit)		Reference	Comment
			Memcor	Zenon		
<b>Capital Costs:</b>						
1	Land acquisition	acre	\$ 3,500	\$ 3,500	A	1996 \$'s <sup>1</sup>
2	Influent pumping station (medium head)	L.S.	\$ 18,900,000.00	\$ 18,900,000.00	A	flow weighted
3	FEB	acre	\$ 8,250	\$ 8,250	A	1996 \$'s
4	FEB seepage pump station	acre FEB	\$ 220	\$ 220	A	1996 \$'s
5	Treatment plant influent pumping station	L.S.	\$ 6,000,000	N/A	B	
6	Treatment plant (equipment, backwash basin, building)	L.S.	\$ 108,552,000	\$ 96,216,000	C	
7	Sludge treatment and disposal (basin and equipment)	mgd	\$ 7,500	\$ 7,500	B	
8	Effluent pump station (medium head)	L.S.	\$ 18,900,000.00	\$ 18,900,000.00	A	flow weighted
<b>O&amp;M Costs:</b>						
9	Influent pumping station (medium head)	189 mgd	\$ 520,000	\$ 520,000	A	1996 \$'s flow weighted
10	FEB	acre	\$ 60	\$ 60	A	1996 \$'s
11	FEB seepage pumping station	L.S.	\$ 165,000	\$ 165,000	A	1996 \$'s
12	Treatment plant influent pumping station	mgd	\$ 3,000	N/A	A	1996 \$'s
13	Chemicals					
	Citric acid	lb	\$ 0.90	\$ 0.90	D	
	Bleach	gal	\$ 0.75	\$ 0.75	E	
	Ferric sulfate	dry ton	\$ 150	\$ 150	F	
	Alum	dry ton	\$ 150	\$ 150	G	
14	Sludge treatment and disposal	mgd	\$ 1,200	\$ 1,200	A	1996 \$'s
15	Labor (600 hrs/week)	hr	\$ 30	\$ 30	C	
	Electric	kWh	\$ 0.065	\$ 0.065	C	
	Membrane replacement	membranes	\$ 3,457,000	\$ 3,075,000	C	
16	Sampling and monitoring	yr	\$ 300,000	\$ 300,000	A	1996 \$'s
17	Effluent pumping station (medium head)	189 mgd	\$ 520,000	\$ 520,000	A	1996 \$'s flow weighted

Notes:

A PEER Consultant, P.C./Brown and Caldwell, J.V.; Desktop Evaluation of Alternative Technologies, Final Report; August 1996.

<sup>1</sup> Assume an average annual inflation rate of 3% to convert costs to 1997 dollars (PEER/Brown and Caldwell, 1996).

N/A = Zenon membranes will be suspended in feed canal, therefore, a treatment plant influent pump station is not required.

B Conestoga-Rovers & Associates.

C MF vendors (Memcor and Zenon).

D HCl Industrial

E Piccard Chemical

F Kemiron

G General Chemical

TABLE 5.9

## SUMMARY OF KEY COST ESTIMATION FACTORS

**POST STA SCENARIO**

Item No.	Description	Unit	Cost (\$/unit)		Reference	Comment
			Memcor	Zenon		
<b>Capital Costs:</b>						
1	Land acquisition	acre	\$ 3,500	\$ 3,500	A	1996 \$'s <sup>1</sup>
2	Influent pumping station		\$ -	\$ -		N/A
3	FEB		\$ -	\$ -		N/A
4	FEB seepage pump station		\$ -	\$ -		N/A
5	Treatment plant influent pumping station	L.S.	\$ 5,300,000	*	B	flow weighted
6	Treatment plant (equipment, backwash basin, building)	L.S.	\$ 94,980,000	\$ 84,204,000	C	flow weighted
7	Sludge treatment and disposal (basin and equipment)	mgd	\$ 7,500	\$ 7,500	B	
8	Effluent pump station		\$ -	\$ -		N/A
<b>O&amp;M Costs:</b>						
9	Influent pumping station		\$ -	\$ -		N/A
10	FEB		\$ -	\$ -		N/A
11	FEB seepage pumping station		\$ -	\$ -		N/A
12	Treatment plant influent pumping station	mgd	\$ 3,000	*	A	1996 \$'s
13	Chemicals					
	Citric acid	lb	\$ 0.90	\$ 0.90	D	
	Bleach	gal	\$ 0.75	\$ 0.75	E	
	Ferric sulfate	dry ton	\$ 150	\$ 150	F	
	Alum	dry ton	\$ 150	\$ 150	G	
14	Sludge treatment and disposal	mgd	\$ 1,200	\$ 1,200	A	1996 \$'s
15	Labor (600 hrs/week)	hr	\$ 30	\$ 30	C	
	Electric	kWh	\$ 0.065	\$ 0.065	C	
	Membrane replacement	membranes	\$ 3,173,000	\$ 2,821,000	C	
16	Sampling and monitoring	yr	\$ 150,000	\$ 150,000	A	1996 \$'s
17	Effluent pumping station		\$ -	\$ -		N/A

**Notes:**

**A** PEER Consultant, P.C./Brown and Caldwell, J.V.; Desktop Evaluation of Alternative Technologies, Final Report; August 1996.

<sup>1</sup> Assume an average annual inflation rate of 3% to convert costs to 1997 dollars (PEER/Brown and Caldwell, 1996).

N/A = Item not necessary for Post-STA design

\* = Zenon membranes will be suspended in feed canal, therefore, a treatment plant influent pump station is not required.

**B** Conestoga-Rovers & Associates.

**C** MF vendors (Memcor and Zenon).

**D** HCI Industrial

**E** Piccard Chemical

**F** Kemiron

**G** General Chemical

The Desktop Evaluation of Alternative Technologies Final Report (August 1996), prepared by Brown and Caldwell for the South Florida Water Management District, was used to provide various unit costs and is referenced accordingly. These costs were converted to 1997 dollars by assuming an average annual inflation rate of 3 percent (Brown and Caldwell, August 1996). Details on the development of costs for the major categories identified in Table 5.7 are provided below:

### **5.3.1 CAPITAL COSTS**

**Land Acquisition.** Land acquisition costs for STAs, FEBs, treatment plant sites, and sludge disposal sites were calculated at a price of \$3,500 per acre. In all cases, it was assumed that 10 percent more land must be acquired to allow for additional facilities and construction and buffer zones where required (Brown and Caldwell, August 1996).

**Influent Pumping Station.** Brown and Caldwell (August 1996) indicated a representative base construction cost, exclusive of construction contingencies, for STA pump stations. The base construction cost was increased due to the higher head requirement of conveying flow into and out of the FEB. The pump stations cost was then estimated assuming that similar pump stations costs vary on a flow proportional basis (Brown and Caldwell, August 1996).

The base construction cost of the influent and effluent pump stations for the Post-BMP scenario are equal. In the Post-STA scenario, additional influent and effluent pump stations are not necessary.

**Flow Equalization Basin (FEB).** A base construction cost of \$8,250 per acre was used for all FEB construction (Brown and Caldwell, August 1996).

**Seepage Pump Station.** Prescott Follett & Associates and Brown and Caldwell estimated the base construction cost of the STA 2 seepage pump station (Pumping Station G-337) to be approximately \$680,000 (Brown and Caldwell, August 1996). The base construction costs for FEB seepage pump stations were estimated to be 2 times the base construction cost of STA seepage stations (Brown and Caldwell, August 1996). The cost of a particular seepage pump station was then calculated assuming that base construction cost of similar stations would vary on a flow proportional basis.

**Treatment Plant Influent Pumping Station.** The base construction costs of the treatment plant influent pumping stations include associated costs for the pump station,

pipeline feed to the filtration units, and a 0.015-inch (400-micron) strainer/screen system. A base cost of approximately \$6 million was calculated for an average design flow of 200 mgd. Similar pump station costs were calculated assuming that the base construction cost would vary on a flow proportional basis.

**Sludge Treatment and Disposal.** Brown and Caldwell (August 1996) estimated a base construction cost for sludge treatment and disposal facilities of \$20,000 per mgd of average daily design flow. However, the chemical dosages of the MF treatment plant will be considerably less than the chemical treatment technologies discussed in the Brown and Caldwell document. The lower solids production rate will reduce the Brown and Caldwell value from \$20,000 per mgd to approximately \$7,500 per mgd. This lower value was used to compute sludge treatment and disposal costs.

### **5.3.2 CONTINGENCY COSTS**

**Construction Contingencies.** Construction contingency costs were assumed to total 20 percent of the aggregate base construction cost (Brown and Caldwell, August 1996).

**Engineering, Permitting and Construction Management.** Engineering, permitting and construction management costs were assumed to total 15 percent of construction costs, including contingency costs (Brown and Caldwell, August 1996).

### **5.3.3 OPERATION AND MAINTENANCE (O&M) COSTS**

O&M costs were developed using vendor supplied information and other sources noted below:

**Pump Stations.** Brown and Caldwell (August 1996) estimated the annual O&M costs for low-head pumping stations. The O&M costs for medium and high head pumping stations was estimated to be 10 percent and 20 percent higher, respectively, than the cost of low head pumping stations (Brown and Caldwell, August 1996). It was assumed that if both an influent and effluent pumping station were included, the annual O&M cost of each station would be reduced by one-third. If a treatment plant influent pump station is also involved, it was assumed that the annual O&M cost of the third station would be reduced by one-half (Brown and Caldwell, August 1996). It was assumed that the annual O&M costs would then vary on a flow proportional basis.

**Flow Equalization Basin (FEB).** Annual O&M costs for maintenance and repair of FEBs were estimated to be \$60 per acre (Brown and Caldwell, August 1996).

**Chemical Costs** - Chemical costs were estimated based on the pilot studies chemical dosages and chemical cleaning requirements. Nominal chemical dosages of 8 mg/L as Fe for Post-BMP and 3 mg/L as Fe for Post-STA application were used to calculate chemical these chemical costs. Quotes for chemical costs were obtained directly from the suppliers. The costs for alum and ferric chloride were both quoted to be on the order of \$150 per dry ton. For Post-BMP applications MF membrane chemical cleaning was estimated to occur every 14 days and for Post-STA application cleaning occurs every 21 days. For the Memcor unit, citric acid was used for chemical cleaning with one reuse of the cleaning solution. For the Zenon unit, chemical cleanings alternate between citric acid and sodium hypochlorite. One reuse was estimated for the citric acid solution and no reuse of the sodium hypochlorite solution.

**Sludge Treatment and Disposal.** It was estimated that the cost of operating and maintaining the sludge treatment and disposal equipment would average about \$1,200 per year per mgd of average daily flow treated at the plant (Brown and Caldwell, August 1996). This estimate was used in developing the costs for the MF treatment system but it may be high, depending upon the sludge disposal option ultimately chosen. Sludge treatment and disposal costs will be much lower than \$1,200 per year per mgd if the technique of direct land application of the liquid backwash solids is employed.

**Labor, Electric, and Membrane Replacement.** Memcor and Zenon provided estimates of labor and electrical consumption. A cost of \$0.065/kWh was used to estimate the electrical costs (Bob Irvin, SFWMD). The MF membrane replacement costs were estimated assuming membrane replacement every 3 years for Post-BMP applications and every 4 years for Post-STA applications.

With regards to staffing requirements, it was assumed the treatment systems would require operators to be present 16 hours per day, 7 days per week. A total of three operators and one supervisor will be required for operating the full-scale system and managing the solids residuals program. Staffing requirements are estimated to be the same for either Memcor or the Zenon system and there would be no difference in size of the staff related to a Post-BMP versus a Post-STA system.

**Treatment Plant Sampling and Monitoring.** It was assumed that sampling and monitoring of the MF treatment plant would cost approximately \$300,000 per year (Brown and Caldwell, August 1996).

#### **5.3.4 REPLACEMENT COSTS**

The replacement cost estimate includes costs for the pump stations, chemical feed system, treatment plant equipment (except membrane replacement), and the sludge treatment and disposal equipment. The replacement costs ranged from \$24.2 million to \$21.9 million for Post-BMP application and from \$12.7 million to \$10.7 million for Post-STA application.

#### **5.3.5 SALVAGE COSTS**

Salvage estimates were prepared considering both salvage value and salvage costs (Brown and Caldwell, August 1996). These costs include demolition costs, restoration costs, and land value. It was assumed that the land purchased for sludge disposal land was dedicated and no land value or restoration costs were assigned (Brown and Caldwell, August 1996). In all cases, demolition and land restoration costs exceeded the land value (negative net salvage value).

#### **5.3.6 PRESENT WORTH ANALYSIS**

Present worth calculations were performed based on capital and O&M estimates. Estimates of the 50-year present worth for the MF treatment ranged from \$553 million to \$498 million for a 200-mgd treatment facility and Post-BMP application and from \$308 million to \$259 million for a 175-mgd plant and Post-STA application. A discount rate of 4 percent was used for completing the present worth analysis and was developed assuming an interest rate of 6.8 percent along with a 2.8 percent annual inflation rate ( $6.8 - 2.8 = 4$  percent)

#### **5.3.7 UNIT TREATMENT COSTS**

The present worth cost with respect to gallons treated and phosphorus removed are summarized below for both the Zenon and Memcor:

<b>Present Worth</b>	<b>Post-BMP</b>		<b>Post-STA</b>	
	<b>Memcor</b>	<b>Zenon</b>	<b>Memcor</b>	<b>Zenon</b>
Dollars per Million Gallons Treated, \$/MGD	196.9	177.0	136.8	115.0
Dollars per Pound of Phosphorus Removed, \$/#	253.2	227.7	549.7	462.0

The total flow during the 10-year period of record for the Post-BMP and Post-STA scenarios, 562,000 mgal and 450,000 mgal, respectively, was multiplied by five to reach a 50-year amount. The difference of the total phosphorus load and the microfiltration blended effluent phosphorus content was multiplied by five to reach a 50-year amount.

The costs shown for the Post-STA "dollars per pound of P removed" are much higher than the Post-BMP values due to the low levels of phosphorus being treated. The Post-STA effluent waters will typically contain less than 50 parts per billion of total phosphorus and the MF treatment system is reducing these levels to the 10 part per billion range. The removal costs are higher due to the relatively small amount of total phosphorus being processed.

**References**

PEER Consultants, P.C./Brown and Caldwell, J.V.; Desktop Evaluation of Alternative Technologies, Final Report; South Florida Water Management District; August 1996.

PEER Consultants, P.C./Brown and Caldwell, J.V.; Supplemental Technology Demonstration Project Contract Requirements, Draft; South Florida Water Management District; August 1996.

APPENDIX 1

DAILY OPERATING LOGS

**TABLE 1. MEMCOR DAILY OPERATIONAL LOG**

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
10/30/96	14:00		0.3 hr.								LK	
10/31/96	12:00	30.36	0.3 hr.	29.8	30.1	22.4	7.55	51.8	50.4		LK	No totalizer yet
10/31/96	2:00	32.36	0.3 hr.	29.8	30.1	22.4	7.55	52.4	50		LK	
11/1/96	12:50	37.34	0.3 hr.	30.1	30.5	23.1	7.2	48.1	46.5		LK	
11/1/96	14:10	38.7	0.3 hr.	29.9	30.3	23.2	6.9	49.3	46.2		LK	
11/4/96	11:55	42.4	0.3 hr.	29.9	30.3	21.8	8.3	50.6	48.6		LK	
11/4/96	14:30	44.93	0.3 hr.	29.8	30.2	22	8	50.8	49.1		LK	
11/5/96	9:50	46.78	0.3 hr.	29.9	30.3	21.8	8.3	50.3	48.9		LK	Totalizer installed
11/6/96	10:00	51.19	0.3 hr.	29.9	30.2	21.8	8.25	50.7	49.2		LK	
11/6/96	12:30	52.88	0.3 hr.	29.8	30.1	21.3	8.65	52	50.6	11370	LK	
11/7/96	13:15	57.99	0.3 hr.	29.9	30.1	22	8	50.2	47.8	27310	LK	
11/7/96	15:10	59.83	0.3 hr.	29.9	30.3	22	8.1	49.4	48.1	33030	LK	
11/8/96	9:50	61.37	0.3 hr.	30	30.4	22	8.2	49.5	47.4	37890	LK	
11/8/96	13:00	64.42	0.3 hr.	29.9	30.3	22	8.1	50.1	47.4	47390	LK	
11/11/96	11:10	68.57	0.3 hr.	29.3	29.7	20.7	8.8	46.2	45.9	60200	LK	
11/11/96	14:50	71.6	0.3 hr.	29.9	30.4	20.3	9.85	49	47.2	69610	LK	
11/12/96	11:45	74.82	0.5 hr.	30	30.4	19.7	10.5	47.9	46.7	79290	LK	
11/12/96	13:20	76.38	0.5 hr.	30	30.4	19.7	10.5	48.1	46.9	83950	LK	
11/13/96	10:45	79.25	0.5 hr.	30.1	30.4	19.4	9.7	47.2	46.1	92380	LK	
11/13/96	11:07	79.58	0.5 hr.	30	30.3	19.8	10.35	47.8	46.5	93360	LK	Backwash just completed
11/13/96	12:30	80.82	0.5 hr.	30.1	30.5	18.8	11.5	46.9	45.3	96930	LK	2 min. before backwash

<sup>1</sup>TM Tr Me r e re ure  
l e u Me ure e F i r e T i e r g u e f r u r i e

TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
11/13/96	12:35	80.92	0.5 hr.	29.9	30.3	19.9	10.2	48	46.7	97280	LK	2 min. after backwash
11/13/96	2:40	82.75	0.5 hr.	30	30.5	18.7	11.55	46.2	45.1	102620	LK	2 min. before backwash
11/13/96	2:45	82.86	0.5 hr.	29.7	30.2	19.5	10.45	47.3	46	102960	LK	Just after backwash ends
11/14/96	12:05	85.72	0.5 hr.	29.9	30.4	20.2	9.95	49.3	47.4	111610	LK	
11/14/96	12:35	86.49	0.5 hr.	30.1	30.4	20.1	10.15	48.7	47.2	113990	LK	7 min. before backwash
11/14/96	1:08	86.65	0.5 hr.	29.9	30.3	20.3	9.8	49.4	47.3	114540	LK	2 min. after backwash
11/14/96	2:35	88.12	0.5 hr.	29.9	30.4	19.8	10.35	48.8	47.1	118950	LK	Just before backwash
11/14/96	2:50	88.33	0.5 hr.	30	30.4	20.1	10.1	50.1	47.3	119650	LK	After backwash
11/15/96	11:15	90.83	0.5 hr.	29.9	30.3	20.1	10	49.5	47.1	127210	LK	After backwash
11/15/96	12:35	92.13	0.5 hr.	29.9	30.4	19.5	10.65	47.5	46.7	131130	LK	
11/15/96	12:45	92.35	0.5 hr.	29.9	30.5	19.4	10.8	48.5	46.1	131690	LK	2 min. pre-backwash
11/15/96	12:50		0.5 hr.	29.9	30.4	19.8	10.35	48.6	46.7	132190	LK	1 min. after backwash
11/18/96	11:55	96.94	0.5 hr.	30	30.4	19.4	10.8	48.1	46	145550	LK	
11/18/96	2:40	99.55	0.5 hr.	30	30.4	18.6	11.6	46.4	45	153180	LK	Just before backwash
11/18/96	2:45	99.66	0.5 hr.	30	30.4	19.2	11	46.8	45.4	153560	LK	Just after backwash
11/19/96	1:45	104.11	0.5 hr.	30.2	30.6	16.5	13.9	42.4	41.6	166110	LK	Just before backwash
11/19/96	1:50	104.16	0.5 hr.	29.8	30.2	18.6	11.4	46	44.4	166320	LK	Just after backwash
11/21/96	2:00	114.09	0.5 hr.	29.9	30.3	17.7	12.4	48.5	48	198890	LK	Before backwash
11/21/96	2:10	114.89	0.5 hr.	29.6	30.1	18.1	11.75	50.7	48.9	201190	LK	After backwash
1/2/97	14:00	122.88	0.5 hr.	25.6	26	15.2	10.6	46	44.4	223240	LK	1st day new coarse filter in use
1/2/97	3:45	124.6	0.5 hr.	25.8	26.1	14.3	11.65	45.4	43.1	228040	LK	After filter bashwash

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
1/8/97	11:30	127.06	0.5 hr.	25.5	25.9	15.6	10.1	46.8	44.7	234820	LK	After backwash
1/8/97	2:00	129.3	0.5 hr.	25.7	26.1	14.4	11.5	43.9	42.8	241030	LK	
1/8/97	3:30	130.63	0.5 hr.	25.7	26.1	12	13.9	44.1	42	244720	LK	Strainer backwashing
1/9/97	12:15	132.12	0.5 hr.	25.8	26.1	12.6	13.3	44.4	42.6	248910	LK	
1/9/97	16:20	135.86	0.5 hr.	26.1	26.5	10.7	15.6	40.2	39.9	259060	LK	
1/10/97	11:30	137.94	0.5 hr.	25.9	26.4	10.1	16.05	44.2	42.2	264770	LK	
1/10/97	2:00	140.29	0.5 hr.	27	27.4	6.1	21.1	43.9	39.4	265000	LK	
1/10/97	2:15	140.51	0.5 hr.	26.1	26.6	10	16.35	39.3	39.1	271030	LK	
1/13/97	3:15	143.71	0.5 hr.	27.5	27.8	5.3	22.35	31.4	29.3	278540	LK	Pre backwash
1/13/97	3:25	143.7	0.5 hr.	26.5	26.8	8.7	17.95	38.3	37.7	278750	LK	After backwash
1/14/97	10:40	144.36	0.5 hr.	26.5	26.9	9.2	17.5	38	38	280540	LK	After 3 backwashes
1/14/97	12:25	145.75	0.5 hr.	27	27.4	6.9	20.3	35.6	33.5	283840	LK	
1/14/97	2:50	148.36	0.5 hr.	27.6	28	3.8	24	29.6	27.2	289250	LK	
1/16/97	2:30	152.87	0.5 hr.	28.5	28.9	8.5	20.2	37.3	37.1	309400	LK	After Chem. Cleaning
1/16/97	3:00	153.3	0.5 hr.	28.6	29	7.5	21.3	34.7	34.9	310450	LK	
1/20/97	11:50	155.74	0.5 hr.	27.7	28	12	15.85	45.5	44.1	319730	LK	After Citric acid cleaning
1/20/97	12:40	156.6	0.5 hr.	27.9	28.4	11.3	14.85	42.8	42.6	322180	LK	
1/20/97	13:00	156.89	0.5 hr.	28.1	28.4	10.7	17.55	42.6	41.6	322910	LK	
1/28/97	11:45	159.15	0.5 hr.	30.1	30.5	21.5	8.8	46.2	44.8	331910	LK	After 6th filter opened
1/29/97	9:10	162.35	0.5 hr.	30.1	30.5	23.2	7.1	45.7	44.8	344710	LK	Chem. cleaning complete
1/29/97	11:10	163.17	18 min/0.3 hr	28.1	28.5	20.9	7.4	43.7	42.5	346980	LK	

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
1/29/97	15:15	167.2	18 min.	27.7	28.1	18.8	9.1	45.8	43.8	358610	LK	
1/30/97	11:00	168.66	18 min.	27.9	28.2	17	11.1	43.9	44.7	362710	LK	
1/30/97	11:15	168.83	18 min.	27.4	27.9	17.2	10.45	47.5	45.8	363240	LK	After backwash
1/30/97	1:20	170.8	20 min.	27.9	28.3	14.7	13.4	44.2	43	368900	LK	High TMP
1/30/97	1:30	171	20 min.	27.6	28	14.7	13.1	44.8	44.8	369500	LK	After backwash
1/30/97	2:45	172.24	20 min.	27.4	27.8	15.3	12.3	47	45.5	373120	LK	After backwash
1/31/97	10:15	174.64	20 min.	27.7	28.1	14.5	13.4	45.2	44.7	380040	LK	
1/31/97	12:10	176.53	20 min.	28.2	28.7	11.7	17.2	41.2	40.3	385340	LK	
1/31/97	2:57	179.23	20 min.	28.5	28.9	9.5	19.2	37.6	37	392520	LK	
2/5/97	10:30	181.9	20 min.	30	30.5	22.5	7.75	45.6	44.8	405760	LK	Strainer off, Mem. Clean
2/5/97	13:30	184.96	20 min.	27.9	28.3	20	8.2	44.1	42.7	414370	LK	Strainer valve on
2/5/97	3:20	186.72	20 min.	28.1	28.4	19	9.25	42.6	41.5	419240	LK	
2/6/97	3:30	191.97	20 min.	28	28.4	17.2	11	42.8	42	433920	LK	
2/7/97	2:05	197.24	20 min.	27.9	28.3	16.5	11.6	43.3	43.1	448940	LK	
2/7/97	4:00	199.04	20 min.	27.8	28.2	16.7	11.3	44.8	43.5	454050	LK	
2/10/97	9:05	199.67	20 min.	27.8	28.2	16.9	11.1	44.4	43.8	455830	LK	
2/10/97	2:22	204.82	20 min.	27.8	28.3	16.7	11.8	44.6	43.3	470560	LK	
2/11/97	10:50	206.96	20 min.	27.7	28.1	17.3	10.6	45	44.4	476720	LK	
2/11/97	2:30	210.55	20 min.	27.8	28.2	17.1	11.4	44.6	44.3	487100	LK	
2/12/97	12:47	213.06	20 min.	27.9	28.3	17.5	10.6	44.7	43.5	494240	LK	
2/12/97	3:15	215.53	20 min.	27.9	28.3	17.3	10.8	43.9	43.2	501270	LK	

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
2/13/97	12:10	220.12	20 min.	27.7	28.2	18.1	9.85	45.4	44.4	514560	LK	
2/13/97	2:40	222.57	20 min.	27.8	28.3	17.2	11.4	44.2	43.4	521550	LK	
2/14/97	12:30	226.4	20 min.	27.7	28.2	17.8	10.15	44.3	43.9	532640	LK	
2/14/97	2:45	228.56	20 min.	27.7	28.1	17.8	10.1	46.2	44.2	538870	LK	
3/21/97	1:00	241.87	0.3 hr.	27.5	27.9	16.4	11.3	43.7	42.7	575940	LK	Started at Effluent End
3/21/97	3:00	243.29	0.3 hr.	25.5	25.9	12.3	13.4	42	41.6	579750	LK	
3/24/97	8:00	243.37	0.3 hr.	27.8	27.9	14.2	13.65	44.3	43.5	580010	LK	
3/24/97	10:30	243.77	0.3 hr.	27.7	28	14.1	13.75	45.1	44.8	581170	LK	
3/24/97	2:30	247.69	0.3 hr.	28	28.4	11	17.2	42.4	41.1	592160	LK	Term Backwash
3/24/97	3:40	248.82	0.3 hr.	27.7	28	9.9	17.95	44	43	595350	LK	
3/25/97	2:10	252.12	0.3 hr.	28.1	28.5	17.9	10.4	41.3	40.1	610440	LK	After Chem. Clean
3/26/97	10:30	253.77	0.3 hr.	28.3	28.7	17.7	10.8	39.5	37.8	614680	LK	
3/26/97	3:15	257.09	0.3 hr.	27.4	27.8	14.4	13.2	39.8	39.4	623180	LK	After Backwash
3/27/97	9:00	258.16	0.3 hr.	27.7	28.5	15.1	13	40.1	40.7	627290	LK	Start Run 41
3/27/97	2:00	261.97	0.3 hr.	27.9	28.3	15.2	12.9	40.9	40	635880	LK	After backwash
3/27/97	3:30	263.5	0.3 hr.	28.2	28.6	14.3	14.1	39.6	39.1	639830	LK	
4/1/97	9:30	265.14	0.3 hr.	24.8	25.1	10.7	14.25	40.3	40.5	644250	LK	Start Run 42
4/1/97	12:45	268.37	0.3 hr.	24.8	25.1	11.6	13.35	38.1	39.7	652430	LK	
4/1/97	14:20	269.96	0.3 hr.	25.5	25.3	10.3	15.1	38.9	39.8	656380	LK	
4/2/97	11:30	273.17	0.3 hr.	27.7	28.1	14.1	13.8	40.3	39.7	664970	LK	Start Run 42a
4/2/97	2:55	276.28	0.3 hr.	28.1	28.5	13.4	14.9	39.7	38.6	672920	LK	

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
4/3/97	12:00	279.13	0.3 hr.	28	28.4	12	16.2	40.7	39.7	680150	LK	Start Run 43
4/3/97	3:20	282.31	0.3 hr.	28.3	28.6	11.5	16.95	40.4	38.9	688400	LK	
4/4/97	10:10	283.73	0.3 hr.	28.1	28.5	11.8	16.5	40.6	39.5	692090	LK	Start Run 43a
4/4/97	1:55	287.62	0.3 hr.	30.4	30.9	14.6	16.05	39.5	39.5	702110	LK	
4/4/97	3:30	288.81	0.3 hr.	30.1	30.5	12.6	17.7	42.1	40.4	705390	LK	
4/7/97	2:00	290.17	0.3 hr.	30.2	30.5	22.7	8.6	40.5	40	712260	LK	After Chem. Clean-Citric Acid/Start Run 44
4/7/97	2:15	290.9	0.3 hr.	30.3	30.6	22.5	8.9	40.7	40.3	712010	LK	After 1st Backwash
4/8/97	10:30	291.59	0.3 hr.	30.4	30.8	25.9	4.7	40.9	39.6	719300	LK	After Chem. Clean
4/8/97	12:00	293.27	0.3 hr.	28.4	28.8	23.4	5.2	38.3	39.2	723540	LK	
4/8/97	3:00	296.14	0.3 hr.	27.5	27.8	21.2	6.45	39.6	39.4	731030	LK	
4/8/97	3:45	296.66	0.3 hr.	27.4	27.7	21.1	6.45	39.7	39.4	732430	LK	
4/9/97	12:00	300.36	0.5 hr.	28.1	28.6	19.1	9.25	41	40.5	746700	LK	Start 30 Min. Backwash/Start Run 45
4/9/97	3:00	303.54	0.5 hr.	28	28.5	19.4	8.85	40.3	39.5	749410	LK	
4/10/97	10:25	314.01	0.5 hr.	28.2	28.6	18.8	9.6	39.7	36.7	775020	LK	After backwash
4/10/97	1:00	316.56	0.5 hr.	28.2	28.6	16	12.4	39	38.6	781290	LK	Start Run 46
4/11/97	10:05	337.19	0.33	28.1	28.5	14.6	13.7	39.6	39.1	835010	RP	Before backwash
4/11/97	16:11	343.46	0.33	29.9	30.3	15.5	14.6	40.1	40.7	851340	RP	Sump Pump Installed/Recirc./Run 46a
4/14/97	11:35	399.54	0.33	29.7	30.1	12.5	17.4	41.3	40.1	1001070	RP	Start Run 47
4/14/97	15:40	403.54	0.33	29.1	29.5	9.7	19.6	40.3	39.7	1008200	RP	Eliminator not Working
4/15/97	15:15	406.68	0.33							1008600	RP	Intitiate Clean/Start Run 47a
4/15/97	16:06	407.53	0.33							1014220	RP	Soak Overnight

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
4/16/97	11:30	407.67	0.33	29.3	29.7	20.7	8.8	40.7	39.7	1014620	RP	Basket Strainer in Use
4/16/97	16:40	409.32	0.33	29.9	30.3	22.1	8	45.2	44.7	1019030	RP	Start Run 48
4/17/97	15:10	431.81	0.33	29.8	30.2	21.5	8.5	44.5	44	1082000	RP	
4/17/97	18:15	434.07	0.33	30.1	30.5	21.9	8.4	46.9	46.7	1088370	RP	Backwash Recirc. - Disconnected/Start Run 49
4/18/97	9:00	445.27	0.33	29.8	30.4	21.5	8.6	47.3	46.5	1119690	RP	System Off - Restarted
4/18/97	12:50	449.1	0.33	30	30.4	22	8.2	46.2	45.9	1130230	RP	Stop Run 49/End Chem. Feed
4/19/97	17:00	464.58	0.33	29.9	30.3	21.7	8.4	48	46.5	1173700	RP	
4/20/97	14:15	471.59	0.33	30.2	30.5	22.7	8.6	47.5	45.8	1193310	RP	Clean Filter
4/20/97	19:00	475.5	0.33	30.3	30.7	21.8	8.7	44.2	43	1204060	RP	
4/21/97	12:30	492.78	0.33	29.8	30.2	21	9	42.1	40.7	1251800	RP	Bio Assay/Stop Chem. Feed
4/22/97	9:32	513.21	0.33	30	30.4	21	9.2	42.3	41.3	1308540	RP	Cleaned Filter/Start Run 50
4/22/97	15:25	518.79	0.33	30.1	30.5	21.4	8.95	43.1	42.3	1324020	RP	
4/23/97	7:16	534.12	0.33	28.5	29	19	9.75	39.3	39.1	1364790	RP	
4/23/97	9:45	536.22	0.33	27.7	28.1	18.9	9	42.5	41.4	1370650	RP	Not Running/Start Sample Run 51
4/23/97	18:01	544.28	0.33	30.5	30.8	19.2	11.45	40.6	39.8	1389990	RP	
4/24/97	9:07	546.04	0.33	30.6	31	18.6	12.2	39.9	38.5	1396920	RP	Stop & Clean Filter/Stop Run 51
4/24/97	13:42	550.94	0.33	30.5	30	18.7	12	40	39	1408770	RP	Start Run 52
4/24/97	16:09	552.74	0.33	30.4	30.8	18.9	11.7	40.5	18.9	1414480	RP	
4/24/97	16:17	552.74	0.33	30.4	30.8	18.9	11.7	40.5	39.4	1414480	RP	Clean Filter
4/25/97	9:43	569.88	0.33	30.2	30.6	17.9	12.5	38.6	37.6	1458520	RP	
4/25/97	10:17	570.41	0.33								RP	Start Chemical Feed #2/End Run 52

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
4/25/97	12:57	572.72	0.33	30.2	30.7	18	12.45	39.3	37.8	1465550	RP	Clean Filter
4/25/97	13:18	573.07	0.33								RP	Speed 50%/Stroke 75%
4/25/97	16:04	575.75	0.33	30.6	30.9	17.9	12.85	38.8	37.9	1473200	RP	
4/26/97	13:31	593.12	0.33		0.2	0.9	-0.7			1516670	RP	Shutdown
4/26/97	13:36	593.14	0.33	30	30.3	17.6	12.55	38.1	37.1	1516720	RP	Clean Filter
4/26/97	14:15	593.74	0.33	30.3	30.6	17.4	13.05	38.1	37.1	1515200	RP	Stop Chem. Feed
4/26/97	18:18	597.73	0.33	30.3	30.8	16.3	14.24	42.8	41.7	1528160	RP	
4/28/97	10:38	632.79	0.33	29.6	29.9	16.1	13.65	42.3	41.7	1627880	RP	
4/28/97	12:15	634.41	0.33	28.1	28.5	15.3	13	41.4	40.3	1631210	RP	Clean Filter
4/28/97	13:00	635.6	0.33	29.9	30.3	16.8	13.3	40.6	39.9	1633280	RP	Start Auto Sampler/Start Run 53
4/28/97	13:25	635.57	0.33	29.8	30.1	16.5	13.45	40.4	39.7	1634340	RP	Sample Pot/ 1/4 Sample
4/28/97	13:50	636	0.33	29.7	30.1	16.2	13.7	39.6	39.3	1635480	RP	
4/28/97	17:17	639.29	0.33	30.1	30.4	16.8	13.45	41.9	40	1643390	RP	Chem. Feed Low
4/28/97	17:26	639.44	0.33	30	30.3	16.2	13.95	40.1	39.5	1643760	RP	Shutdown/Chem. Feed
4/28/97	17:54	639.79	0.33	29.9	30.2	16.6	13.45	40.8	39.8	1644680	RP	Clean Filter
4/28/97	18:10	640.06	0.33	30.1	30.4	15.5	14.75	41.5	40.5	1645330	RP	Start Chem. Feed
4/29/97	6:24	650.32	0.33	29.2	29.7	15.2	14.25	41	39.1	1672340	RP	Re-Start/Clean Filter/Stop Run 53
4/30/97	12:12	678.07	0.33	29.4	29.8	19.4	10.2	28.4	28.3	1731370	RP	Start Auto Samples/Start Run 54
4/30/97	13:00	678.85	0.33	29.5	29.9	19.4	10.3	28.4	28.4	1732890	RP	Samples
4/30/97	13:37	679.45	0.33	29.5	29.9	20	9.7	28.1	27.8	1734070	RP	Sludge Judge 6"
4/30/97	16:00	681.76	0.33	29.2	29.6	18.6	10.8	31.3	30.9	1739100	RP	2nd Sample/Chem. Feed 27.0

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
4/30/97	16:41	687.44	0.33	29.3	29.7	18.7	10.8	30.9	30.8	1740290	RP	Chemical Feed 26.7
5/1/97	10:40	699.99	0.33	29.3	26.7	18.6	9.4	30.8	30.6	1776310	RP	Sample/Chem. Feed 14.8
5/1/97	12:50	702.12	0.33	29.8	30.3	22.8	7.25	23.6	22.2	1780330	RP	13.6 Chem. Feed/Stop Run 54
5/1/97	13:08	702.42	0.33	29.9	30.3	23	7.1	23.9	27.2	1780840	RP	13.4 Chem. Feed/Start Run 55
5/1/97	14:13	703.46	0.33	29	29.3	18.6	10.55	31.1	31.3	1783060	RP	Collect N-P/Chem. Feed
5/1/97	15:40	704.9	0.33	29.1	29.5	18.5	10.8	31.1	31.5	1786010	RP	Shutdown/Clean Canal Filter
5/1/97	16:00	704.92	0.33	28.7	29	18.4	10.45	30.4	30.5	1786050	RP	Re-Start/Chem. Feed
5/1/97	16:25	705.41	0.33	29.2	29.6	18.7	10.7	31.7	31.1	1787030	RP	Grab Sample/Chem. Feed 11.7
5/2/97	9:29	722.06	0.33	29.3	29.7	17.6	11.9	30.3	30.3	1821330	RP	Chem. Feed 56
5/2/97	13:20	725.8	0.33	29.3	29.6	17.4	12.05	30.1	30	1828730	RP	Sludge Judge 8.5 in./Stop Run 55
5/2/97	14:20	726.91	0.33	29.2	29.6	17.6	11.8	29.9	30	1831000	RP	Refill Chem. Feed
5/2/97	14:38	727.09	0.33	29.3	29.6	18	11.45	29.9	30	1831370	RP	Restart Chem. Feed
5/3/97	17:30	753.31	0.33	29.4	29.9	16.5	13.15	29.3	28.5	1883060	RP	Chem. Feed 24.2 cm.
5/4/97	22:00	781.09	0.33	29.6	30	15.1	14.7	27.5	26.8	1935930	RP	Chem. Feed 9.4 cm.
5/5/97	11:18	794.19	0.33	29.7	30.1	13.3	16.6	26	25.4	1959870	RP	Stop Chem. Feed for Refill
5/5/97	11:34	794.58	0.33	29.5	29.8	9.7	19.95	29.9	29.5	1960600	RP	Chem. Feed 44 cm./Start Run 56
5/5/97	12:02	794.9	0.33	29.3	29.7	9.5	20	29.9	29.6	1961250	RP	Manual Backwash
5/5/97	12:30	795.36	0.33	29.2	29.6	9.5	19.9	30.4	29.5	1962350	RP	Chem. Feed 43.5 cm.
5/5/97	17:00	799.73	0.33	29.5	29.9	8.5	21.2	29.1	28.7	1970870	RP	Chem. Feed 40 cm.
5/5/97	18:45	801.45	0.33	29.6	30	8.5	21.3	28.2	27.9	1974160	RP	Shutdown/Stop Run 56
5/7/97	13:04	801.47	0.33	29	29.5	8.8	20.45	27	28.1	1974190	RP	Restart for Membrane Test/Run 56a

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
5/7/97	15:12	802.5	0.33	29.5	29.9	14.3				1979830	RP	Chem. Clean Citric Acid
5/7/97	14:12	802.5	0.33	29.4	29.8	13.4				1979830	RP	Soaking
5/8/97	11:22	802.69	0.33	30.8	31.2	24.6	6.4	30	30.3	1980500	RP	Restart after Clean/Chem. 38.9
5/8/97	11:36	802.93	0.33	30.8	31.2	24.5	6.5	29.8	30	1980950	RP	Auto Samp./Chem Feed 38.8/Start Run 57
5/8/97	13:06	804.37	0.33	30.8	31.3	24.5	6.55	29.6	30.2	1983950	RP	Backwash
5/8/97	15:13	806.44	0.3	30.8	31.3	24.5	6.55	30.6	30.3	1988280	RP	Chem. Feed 37.4
5/8/97	17:00	808.18	0.3	29.3	29.6	23.2	6.25	29.8	29.3	1991880	RP	1/4 Sample/Chem. 36.3
5/9/97	10:22	825.11	0.3	29.4	29.7	22.8	6.75	29.7	29	2025410	RP	1/2 Sample/Chem. 27
5/9/97	12:23	827.1	0.3	29.4	29.8	22.1	7.5	29	29.1	2029280	RP	Stop Run 57/Auto Off Chem 25.4
5/11/97	20:30	881.74	0.3	29.5	29.8	22.1	7.55	27.9	28.7	2363700	RP	Chem. Feed 35.0
5/12/97	12:13	897.23	0.3	29.5	29.9	20.9	8.8	27.6	27.7	2166180	RP	Start Auto. Sampler 25.4/Run 59
5/12/97	13:47	898.51	0.3	29.4	29.8	20.7	8.9	27.4	27.5	2168650	RP	1/4 Sample/Chem. 24.0
5/12/97	16:00	900.72	0.3	29.4	29.8	20.3	9.3	27.9	27.3	2172840	RP	1/4 Sample/Chem. 20.6
5/12/97	20:25	905.02	0.3	29.5	29.9	20.4	9.3	26.5	26.3	2180890	RP	Chem. Feed 53.3
5/13/97	9:52	918.14	0.3	29.4	29.7	16	13.55	28.2	28.8	2204650	RP	1/4 Sample/Chem. 28.5
5/13/97	11:07	919.38	0.3	29.3	29.7	15.9	13.6	28.6	28.5	2267110	RP	Airleak @ PV3
5/13/97	12:55	921.06	0.3	29.4	29.7	15.6	13.95	28.3	28	2210320	RP	Chem. Feed 22.8/Stop Run 59
5/13/97	13:25	921.6	0.3	29.2	29.6	15	14.4	28.6	29.5	2211390	RP	Refill Chem. Feed 62.5
5/14/97	9:20	941.04	0.3	29.5	29.9	14.3	15.4	26.6	25.9	2249110	RP	Auto Samp./Chem Feed 24.8/Run 61
5/14/97	9:57	941.64	0.3	29.4	29.8	13.4	16.2	28.3	27.6	2250240	RP	Chem. Feed 23.3
5/14/97	10:35	942.31	0.3	29.2	29.6	13.4	16	27.5	27.9	2251500	RP	Memcor Tank/Solids 2.5

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
5/14/97	10:55	942.6	0.3	29.4	29.8	12.8	16.8	26.8	27.4	2251970	RP	Fill Chem. Feed 20.7
5/14/97	11:04	942.72	0.3	29.3	29.7	13	16.5	28.2	28.3	2252230	RP	After Fill/ Chem. Feed 61
5/14/97	12:12	943.83	0.3	29.3	29.7	13	16.5	27.5	27.8	2254330	RP	Chem. Feed 58.5
5/15/97	8:40	963.81	0.3	29.3	29.7	12.1		27.1	27	2291420	RP	1/4 Sample
5/15/97	9:02	964.15	0.3							2292020	RP	Chem. Feed 16.9/Power Out/Stop Run 61
5/16/97	16:29	964.31	0.3	30.9	31.4	14	17.15	32.7	31.8	2292500	RP	After Replacement PV3 & PV8
5/16/97	17:00	964.75	0.3							2293550	RP	Shutdown
5/19/97	11:55	964.94	0.3							2293880	RP	Start Clean - Citric Acid
5/19/97	13:45	966.04	0.3	29.2	29.6	23	6.4	30	30.4	2299950	RP	Start Run 63 / After Auto Sampler Clean
5/19/97	16:15	968.51	0.3	29.1	29.5	22.7	4.6	29.1	29.9	2305010	RP	5 - 4 Sample
5/19/97	16:46	969.05	0.3	29.2	29.6	22.5	6.9	29.2	29.7	2306020	RP	1/4 Sample
5/20/97	8:46	984.64	0.3	29.2	29.6	21.8	7.6	29.4	29.3	2337390	RP	1/4 Sample
5/20/97	14:15	989.97	0.3	29.1	29.5	21.8	7.5	29.2	29.2	2347980	RP	Stop Run 63/Start Run 64
5/21/97	14:10	1013.31	0.3	29.2	29.6	20.7	8.7	28.7	28.4	2394180	RP	Finish Run 64
5/21/97	14:30	1013.63	0.3	29.2	29.6	20.8	8.6	28.8	28.5	2394790	RP	Start Run 65
5/21/97	16:25	1015.51	0.3	29.2	29.6	20.6	8.8	28.4	28.3	2398450	RP	Sample
5/22/97	11:37	1034.23	0.3	29	29.5	19.6	9.65	32.7	26.8	2434840	RP	
5/22/97	11:54	1034.49	0.3	29.2	29.6	19.5	9.9	28.1	27.6	2435280	RP	Sample
5/22/97	15:15	1037.5	0.3	29.1	29.5	19.5		27.9	27.6	2441210	RP	Finish Run 65
5/22/97	15:25	1037.77	0.3	29.3	29.7	19.3	10.2	27.5	27.8	2441540	RP	Start Run 66
5/22/97	15:42	1038.03	0.3	29.3	29.7	19.5	10	28.1	27.8	2442060	RP	Sample

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
5/22/97	15:58	1038.32	0.3	29.3	29.7	19.8	9.7	28	27.4	2442620	RP	N - P
5/22/97	17:05	1039.39	0.3	29.1	29.6	18.9	10.45	29.5	29.2	2444750	RP	Sample
5/23/97	13:45	1059.35	0.3	29	29.6	16.5	12.8	31	26.3	2483370	RP	Sample
5/23/97	15:17	1061.08	0.3	29.4	29.8	16.1	13.5	27	26.8	2486500	RP	Sample
5/23/97	15:37	1061.38	0.3	29.9	29.8	16.2	13.4	26	26.7	2484070	RP	Finish Run 66
5/26/97	18:00	1129.3	0.3	29	29.4	16.8	12.4	32.8	31.6	2625580	RP	Restart / Power Off
5/27/97	11:56	1134.61	0.3	29	29.4	16.4		29.9	31	2636650	RP	Power Off/Restart
5/27/97	14:07	1136.74	0.3	28.8	29.2	15.7		30.8	30.1	2640960	RP	Start Run 68 - 1/4 Sample
5/27/97	16:30	1139.09	0.3	29.1	29.5	15.1		29.3	29.8	2645840	RP	1/4 Sample
5/28/97	11:00	1156.77	0.3	30	30	4.9		18	17	2677100	RP	3 Backwashes
5/28/97	11:05	1156.81	0.3	29.2	29.6	11.1		25.6	24.5	2677230	RP	Restart
5/28/97	11:10	1156.93	0.3	29.7	30.2	7.5		23	21.6	2677400	RP	Stop Run 68 - 1/2 Sample
5/28/97	12:15	1157.11	0.3								RP	Citric Acid Clean
5/28/97	12:53	1157.13	0.3								RP	Restart Clean
5/28/97	18:15	1158.14	0.3	31	31.5	21.4	9.85	28	27.7	2683790	RP	Start Run 69
5/28/97	18:54	1159.14	0.3	31	31.3	15.5	15.65	30.6	30.3	2685810	RP	1/3 Sample - Shutdown
5/29/97	14:45	1159.2									RP	Citric Acid Clean
5/30/97		1160.21								2692000	RP	Clean Finish
5/30/97		1160.24	0.3	30.7	31.2	20.8	10.15	37	36.1	2692070	RP	After Citric acid cleaning
5/30/97	15:20	1163.71									RP	Mem Clean/Start Memcor Unit
5/30/97	16:00	1164.7								2705550	RP	Clean Complete

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
5/30/97	16:12	1164.9	0.3	30.7	31.1	29.7	6.2	33.1	33	2705970	RP	
5/30/97	17:30	1166.93	0.3	30.7	31	24.9	5.95	31.7	30.4	2708720	RP	Start Run 70
5/31/97	8:50	1181.15	0.3	30.7	30.9	23.1	7.7	33.8	27.8	2759200	RP	Sample
5/31/97	10:06	1182.55	0.3	30.9	31.4	22.2	8.95	28	28.1	2741490	RP	Sample/Stop Run 70
6/2/97	8:55	1227.99	0.3	30.8	31.2	19.9	11.1	31	25.9	2818940	RP	Start Run 72
6/2/97	9:22	1228.45	0.3	31	31.4	19	12.2	25.9	25.8	2819710	RP	Sample
6/2/97	11:11	1230.31	0.3	29.6	30	14.6	15.2	23	22.6	2822890	RP	Sample/Adjust Flow
6/2/97	11:20	1230.42	0.3	29.3	29.7	8.4	21.1	26.8	27.3	2823080	RP	Stop Run 72 - 1/2 Sample
6/3/97	15:15	1233.98	0.3	29	29.4	13.7	15.5	31.3	30.8	2830330	RP	After Maintenance on Membrane
6/3/97	15:33	1234.22	0.3	29.4	29.9	18	11.65	24.9	24.6	2830760	RP	Start Run 73
6/3/97	16:07	1234.83	0.3	29.7	30.1	15.9	14	23.2	23.1	2831740	RP	Sample
6/3/97	17:15	1235.91	0.3	29.8	30.2	13.3	16.7	22.4	22	2833520	RP	Sample
6/4/97	7:50	1243.04	0.3							2843900	RP	Power off/Restart 4 Backwash
6/4/97	8:04	1243.28	0.3	30.1	30.5	9.2		20	17.8	2844460	RP	Run 73 Finish
6/4/97	11:45	1243.34								2844560	RP	Citric Acid Clean
6/4/97	13:30	1244.32	0.3	30.7	31.2	21.1		27	26.1	2850290	RP	Citric Clean Finish/Start Mem Clean
6/4/97	15:10	1245.33	0.3	30.9	31.3	19.1		26.2	26.4	2856240	RP	Mem Clean Finish
6/4/97	15:15	1245.39	0.3	30.8	31.3	17.8		28.8	28.9	2856330	RP	Start Run 74
6/5/97	8:50	1251.27								2866080	RP	Citric Acid Clean
6/5/97	11:17	1252.28								2872160	RP	Finish wash/Start 2nd Clean
6/6/97	11:45	1253.29								2878290	RP	Citric Soak Clean/Finish

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
6/6/97	11:52	1253.29	0.3	30.9	31.2	24	7.05	35.1	34	2878310	RP	
6/6/97	12:27	1253.84	0.3	30.8	31.3	24.6	6.45	29.9	30	2879390	RP	Start Run 76
6/6/97	13:12	1254.6	0.3	29.2	29.6	22.9	6.5	29.9	29.2	2880910	RP	
6/8/97	9:19	1297.61	0.3	29.2	29.6	22.9	6.5	29.2	28.4	2966340	RP	Sample
6/9/97	9:32	1318.5								3007840	RP	Shut off Power-Restart/Stop Run 76
6/9/97	10:07	1319.09	0.3	29.2	29.6	22.9	6.5	29	29	3008880	RP	Start Run 77
6/9/97	12:09	1321	0.3	28.9	29.3	22.7	6.4	29.9	29	3012810	RP	Sample
6/9/97		1324.61	0.3	29	29.4	22.7	6.5	28.7	29.5	3019930	RP	Sample
6/10/97	9:24	1330.52								3031550	RP	Power off-Restart
6/10/97	9:32	1330.63	0.3	29.4	29.8	22.6	7	28.9	29.3	3031730	RP	
6/10/97	10:45	1331.83	0.3	29.1	29.5	22.5	6.8	28	29.1	3034080	RP	Sample/Stop Run 77
6/10/97	11:19	1332.28	0.3	29	29.5	22.6	6.65	28.6	29.3	3035190	RP	Start Run 78
6/10/97	12:35	1333.63	0.3	29.1	29.6	22.5	6.85	29.6	29.5	3037610	RP	Sample
6/11/97	8:30	1353.06	0.3	28.9	29.3	22.4	6.7	30.8	28.9	3076120	RP	Sample
6/11/97	11:50	1356.32	0.3	29	29.4	22.5	6.7	29.2	29.2	3082550	RP	Stop Run 78
6/11/97	12:10	1356.63	0.3	28.9	29.3	22.5	6.6	29.6	29.6	3083190	RP	Start Run 79
6/11/97	12:45	1357.23	0.3	29.1	29.5	22.5	6.8	29.8	29.5	3084300	RP	Sample
6/11/97		1359.88	0.3	28.9	29.3	22.6	6.5	30	29.6	3089610	RP	Sample
6/11/97	11:20	1379.24	0.3	29	29.4	22.5	6.7	28.6	29.3	3127980	RP	Sample
6/12/97	12:40	1380.54	0.3	29.1	29.5	22.4	6.9	28.8	29.4	3130500	RP	Stop Run 79
6/12/97	12:50	1380.73	0.3	29.1	29.6	22.6	6.75	29.6	29.4	3130920	RP	Start Run 80

<sup>1</sup>TM Tr Me r e re ure  
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**TABLE 1. MEMCOR DAILY OPERATIONAL LOG**

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
6/12/97	14:00	1381.77	0.3	29.1	29.6	22.4	6.95	28.5	29.2	3132910	RP	Sample
6/12/97	18:37	1326.29	0.3	29.1	29.6	22.4	6.95	28.9	29.3	3141870	RP	Sample
6/13/97	9:35	1400.89	0.3	29	29.4	22	7.2	28.9	29.2	3170580	RP	Sample
6/13/97	12:56	1404.15	0.3	29.1	29.5	22.1	7.2	29.5	29.2	3176980	RP	Sample/Stop Run 80
6/13/97	15:25	1406.61	0.3	29	29.4	22	7.2	29.6	29.2	3181830	RP	Start Run 81
6/13/97	16:04	1407.23	0.3	29.1	29.6	21.9	7.49	28.7	29	3182970	RP	Sample
6/16/97	6:45	1433.6								323890	RP	Power Off/Restart
6/16/97	6:53	1433.75	0.3	29.4	29.8	22.1	7.5	28.5	29.4	3235140	RP	
6/16/97	7:05	1433.96	0.3	29	29.4	22.2	7	28.2	29.2	3235590	RP	Stop Run 81
6/16/97	13:47	1440.49	0.3	29.1	29.5	22.6	6.7	29.5	29.5	3248480	RP	Start Run 82
6/16/97	15:45	1442.39	0.3	29.1	29.5	22.2	7.1	29	29.3	3252220	RP	Sample
6/16/97	17:23	1443.99	0.3	28.9	29.4	22.2	6.95	28.8	29.4	3255440	RP	Sample
6/17/97	10:10	1460.33	0.3	29.1	29.5	21.7	7.6	29.1	29.1	3287580	RP	Sample
6/17/97		1462.8	0.3	29	29.3	21.8	7.35	28.2	29.1	3292110	RP	Sample
6/17/97	13:28	1463.57	0.3	29.1	29.5	21.7	7.6	29	29.3	3293970	RP	Stop Run 82
6/17/97	13:45	1463.83	0.3	29.1	29.5	21.8	7.5	28.8	29.1	3294510	RP	Start Run 83
6/17/97	14:35	1464.42	0.3	29.1	29.5	22.1	7.2	29	29.3	3296480	RP	Sample
6/18/97	9:53	1483.46	0.3	29.1	29.5	21.6	7.7	28.9	29	3333150	RP	Sample
6/18/97	11:10	1484.71	0.3	29.1	29.6	21.4	7.95	28.2	28.5	3335540	RP	Stop Run 83
6/18/97	11:30	1485.04	0.3	29.1	29.5	21.4	7.9	28.6	28.7	3336190	RP	Start Run 84
6/18/97	12:15	1485.77	0.3	29.1	29.6	21.3	8.05	28.4	28.8	3337610	RP	Sample

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
6/18/97	13:50	1487.31	0.3	29	29.4	21.3	7.9	29.1	29.2	3340700	RP	Sample
6/19/97	11:27	1508.42	0.3	29.1	29.5	21	8.3	28.1	29	3382200	RP	Sample/Stop Run 84
6/26/97	14:55	1512.11	0.33	30.4	30.8	29.3	1.3	29.9	30.4	3389220	RP	Start @ Influent
6/27/97	16:48	1517.94	0.33	29	29.4	27.1	2.1	31.7	31.9	3401150	RP	Start Run 85
6/28/97	12:05	1519.66	0.33	29.1	29.5	27.2	2.1	29.9	30.4	3404610	RP	Power off/Restart
6/28/97	14:06	1521.54	0.33	28.3	28.8	26.5	2.05	30.5	31.1	3408360	RP	Sample
6/30/97	9:32	1563.96	0.33	26.7	27.2	24.3	2.65	29.1	30.3	3494020	RP	Sample
6/30/97	11:10	1565.56	0.33	28.2	28.8	26	2.5	30.3	31.1	3497230	RP	Stop Run 85
6/30/97	11:35	1565.95	0.33	28.3	28.7	25.9	2.6	30.6	31.1	3498030	RP	Start Run 86
6/30/97	12:16	1566.65	0.33	26.4	27	24.2	2.5	27.8	30.2	3499470	RP	Sample
6/30/97	14:25	1568.67	0.33	28.8	29.3	26.5	2.55	31.3	31.6	3503640	RP	Sample
7/1/97	8:45	1586.66	0.33	28.7	29.2	26.3	2.65	32	31.4	3541360	RP	Sample
7/1/97	12:08	1589.97	0.33	28.9	29.4	26.4	2.75	32.3	31.5	3548230	RP	Sample/Stop Run 86
7/1/97	12:34	1590.36	0.33	28.9	29.3	26.3	2.8	31.2	31.3	3549050	RP	Start Run 87
7/1/97	13:10	1590.95	0.33	28.8	29.3	26.4	2.65	31.6	31.7	3550340	RP	Sample
7/2/97	11:07	1612.4	0.33	28.9	29.3	26.3	2.8	31.4	31.9	3595340	RP	Stop Run 87/Sample
7/2/97	11:35	1612.84	0.33	28.7	29.2	26.2	2.75	31.7	31.5	3596360	RP	Start Run 88
7/2/97	12:15	1613.51	0.33	28.9	29.4	26.4	2.72	31.6	31.6	3597710	RP	Sample
7/2/97	15:12	1616.37	0.33	28.9	29.3	26.3	2.8	31.4	31.6	3603780	RP	Sample
7/3/97	8:32	1633.31	0.33	28.9	29.3	26.3	2.8	31.4	31.6	3639540	RP	Sample
7/3/97	11:35	1636.3	0.33	28.8	29.3	26.3	2.75	31.2	31.3	3645890	RP	Sample/Stop Run 88

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
7/3/97	12:02	1636.71	0.33	28.7	29.1	26.2	2.8	32.8	31.8	3646730	RP	Start Run 89
7/6/97	11:00	1674									RP	Power Off Restart
7/7/97	12:17	1684.73								3749050	RP	Power Off/Stop Run 89
7/7/97	13:32	1685.91	0.33	28.5	28.9	25.6	3.1	32.1	32.4	3751580	RP	Start Run 90
7/7/97	15:40	1688.02	0.33	28.2	28.6	25.3	3.1	32.8	32.2	3756070	RP	Sample
7/7/97	17:05	1689.38	0.33	28.1	28.5	25.6	2.7	30.7	31.1	3758930	RP	Sample
7/8/97	8:26	1703.38	0.33	28.1	28.5	25.4	2.9	31.7	31.3	3787700	RP	Sample
7/8/97	12:15	1706.83	0.33	28.4	28.9	25.8	2.85	31.4	31.3	3794970	RP	Sample/Stop Run 90
7/8/97	12:38	1707.21	0.33	28.5	28.9	25.9	2.8	30.4	31.5	3795750	RP	Start Run 91
7/8/97	14:07	1708.68	0.33	28.7	29.1	26.1	2.8	29.9	31.8	3798810	RP	Sample
7/9/97	9:09	1727.23	0.33	29	29.4	26	3.2	32.4	31.5	3837800	RP	Stop 91 / Sample
7/9/97	9:34	1727.64	0.33	29	29.4	26	3.2	31.5	31.6	3838620	RP	Start 92
7/9/97	10:15	1728.31	0.33	28.8	29.2	25.9	3.1	31.2	31.8	3840100	RP	Sample
7/9/97	15:00	1732.95	0.33	28.8	29.2	25.9	3.1	32.1	31.6	3849920	RP	Sample
7/10/97	8:54	1750.43	0.33	28.9	29.3	26	3.1	32.1	31.8	3886730	RP	Sample
7/10/97	10:05	1751.58	0.33	28.9	29.3	25.9	3.2	31.7	31.9	3889650	RP	Sample / Finish 92
7/10/97	10:46	1752.29	0.33	28.8	29.2	25.9	3.1	31	31.7	3890660	RP	Start 93
7/10/97	11:40	1753.14	0.33	28.8	29.3	26	3.1	31.2	31.8	3892430	RP	Sample
7/10/97	13:44	1755.16	0.33	28.9	29.2	25.9	3.1	31.1	31.7	3896660	RP	Sample
7/11/97	9:05	1774.06	0.33	28.8	29.3	25.7	3.4	31.3	30.5	3936680	RP	Sample
7/11/97	11:38	1776.56	0.33	28.9	29.3	25.8	3.3	30.4	31.9	3941950	RP	Sample / Finish 93

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
7/11/97	14:52	1779.71	0.33	28.9	29.3	25.7	3.4	31.2	31.9	3948640	RP	Start 94 / Sample
7/12/97	10:10	1781.46								3952310	RP	Power off / Re-start
7/12/97	10:26	1781.75	0.33	29.2	29.6	25.9	3.5	31.9	31.7	3952876	RP	
7/14/97	8:05	1802.2								3996490	RP	Power off / Re-start
7/14/97	10:10	1804.24	0.33	29	29.4	25.8	3.4	32.2	31.7	4000780	RP	Sample / Stop 94
7/14/97	10:38	1804.69	0.33	29.1	29.5	25.8	3.5	31.9	31.8	4001730	RP	Start Run 95
7/14/97	12:31	1806.53	0.33	29.1	29.4	25.8	3.5	32.8	31.8	4005640	RP	Sample
7/14/97	15:00	1808.93	0.33	29.1	29.5	25.9	3.4	31.7	31.9	4010710	RP	Sample
7/15/97	8:55	1826.45	0.33	29.1	29.5	25.8	3.5	31.5	31.8	4047860	RP	Sample
7/15/97	11:25	1828.92	0.33	29.1	29.5	25.8	3.5	31.6	32.2	4053070	RP	Sample/Stop Run 95
7/15/97	11:54	1828.92	0.33	29.1	29.5	25.7	3.6	31.6	32.1	4054070	RP	Start Run 96
7/15/97	12:20	1829.78	0.33	28.9	29.4	25.7	3.5	30.8	32.1	4054960	RP	Sample
7/16/97	13:40	1830.44								4056290	RP	Power Off/Restart Trash Run 96
7/16/97	14:02	1830.8	0.33	29	29.4	25.8	3.4	31.8	31.8	4057050	RP	Start Run 97
7/16/97	14:50	1831.54	0.33	28.8	29.1	25.6	3.4	31.5	31.8	4058600	RP	Sample
7/16/97	17:26	1834.01	0.33	29.1	29.6	25.9	3.5	32.7	32	4063790	RP	Sample
7/17/97	9:34	1847.48								4092200	RP	Power Off/Restart
7/17/97	10:18	1844.13	0.33	29.2	29.6	25.8	3.8	31.5	31.5	4093520	RP	Sample
7/17/97	13:37	1851.37	0.33	28.9	29.3	25.7	3.4	32.2	32	4100420	RP	Sample/Stop Run 97
7/17/97	14:00	1851.77	0.33	29	29.4	25.8	3.4	30.2	32	41012400	RP	Start Run 98
7/17/97	14:25	1852.16	0.33	29	29.5	25.8	3.5	31.6	32	4102080	RP	Sample

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
7/18/97	8:15	1853.95	0.33							4105790	RP	Power off/Restart
7/18/97	8:57	1854.6	0.33	29.2	29.5	25.8	3.55	31.3	31.6	4107110	RP	Sample
7/18/97	10:30	1856.1	0.33	29.1	29.5	25.7	3.6	31.5	31.5	4110270	RP	Sample
7/18/97	13:06	1858.63	0.33	29	29.4	25.7	3.5	32.2	32.1	4115660	RP	Sample/Stop Run 98
7/21/97	11:51	1927.75	0.33	29	29.4	25.4	3.8	31.8	31.4	4261320	RP	Start Run 100
7/21/97	12:47	1928.69	0.33	28.9	29.3	25.3	3.8	31.9	31.5	4263350	RP	Sample
7/21/97	15:17	1931.72	0.33	28.9	29.4	25.4	3.75	30.7	31.6	4268440	RP	Sample
7/22/97	9:33	1948.95	0.33	28.8	29.3	25.2	3.85	31	31.6	4305860	RP	Sample
7/22/97	12:10	1951.49	0.33	28.8	29.3	25.3	3.75	31	31.7	4311040	RP	Sample/Stop Run 100
7/22/97	12:53	1952.18	0.33	29	29.5	25.4	3.85	31	31.9	4312400	RP	Start Run 101
7/22/97	13:08	1952.44	0.33	29	29.5	25.4	3.85	31.5	31.8	4312980	RP	Sample
7/22/97	18:00	1957.19	0.33	29.1	29.5	25.4	3.9	32.5	31.9	4322960	RP	Sample
7/23/97	8:23	1971.2	0.33	29.1	29.5	25.3	4	31.1	31.8	4352380	RP	Sample
7/23/97	12:00	1974.74	0.33	29	29.4	25.3	3.9	31.1	31.9	4359810	RP	Sample/Stop Run 101
7/23/97	12:30	1975.22	0.33	29	29.4	25.2	4	31.3	32	4360820	RP	Start Run 102
7/23/97	12:57	1975.66	0.33	29	29.4	25.2	4	32.2	32	4361720	RP	Sample
7/23/97	15:00	1977.65	0.33	28.8	29.2	25.2	3.8	32.4	32	4366040	RP	Sample
7/24/97	8:35	1994.83	0.33	29	29.4	25.2	4	30.3	31.8	4402260	RP	Sample
7/24/97	12:52	1999.01	0.33	29.2	29.7	25.9	3.6	29.1	29.5	4410920	RP	Stop Run 102/Shutdown Air Compressor
7/24/97	13:28	1999.11	0.33	29.2	29.7	25.6	3.9	30.4	30.8	4411090	RP	Restart Air Compressor
7/24/97	16:45	2002.36	0.33	29	29.5	25.4	3.9	31.5	32	4417890	RP	Start Run 103

<sup>1</sup>TM Tr Me r e re ure  
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**TABLE 1. MEMCOR DAILY OPERATIONAL LOG**

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
7/24/97	17:12	2007.74	0.33	29	29.5	25.3	4	31.9	31.6	4418690	RP	Sample
7/25/97	8:43	2017.9	0.33	29	29.4	25.1	4.1	30.6	31.5	4450390	RP	Sample
7/25/97	10:55	2020.06	0.33	28.9	29.3	25	4.1	32.6	32.3	4454990	RP	Sample
7/25/97	14:04	2023.13	0.33	28.9	29.3	25	4.1	32.6	32.4	4461490	RP	Sample/Stop Run 103
7/25/97	14:24	2023.45	0.33	28.5	28.9	24.8	4	31.1	32.4	4462180	RP	Start Run 104
7/25/97	15:04	2024.11	0.33	28.9	29.2	24.9	4.2	31.2	32.2	4463390	RP	Sample
7/25/97	17:00	2025.95	0.33	28.2	28.6	24.4	4	31.5	31.9	4467420	RP	Sample
7/26/97	10:18	2027.45								4470380	RP	Low Air (Off)/Restart Air
7/26/97	10:56	2027.9	0.33	28.8	29.2	25.1	4	32	32.6	4471340	RP	Sample
7/26/97	20:30	2032								4480280	TE	Power Off/Restart
7/28/97	9:32	2064.11	0.33	28.2	28.7	24	4.5	31.4	31.2	4546150	RP	Sample/Stop Run 104
7/29/97	9:50	2082.19	0.33	28.6	29	24.2	4.6	31.1	31.7	4583150	RP	Start Run 105/Start Alum. 8%
7/29/97	10:54	2083.23	0.33	28.3	28.7	23.9	4.6	31.7	31.3	4585350	RP	Sample
7/29/97	18:07	2090.24	0.33	28.5	28.8	23.6	5.1	31.6	31.7	4599900	RP	Sample
7/30/97	8:10	2093.7	0.33							4607100	RP	Low Air (Rest) Air Compressor
7/30/97	9:17	2094.66	0.33	28.9	29.3	23.7	5.4	30.7	31.4	4609090	RP	Sample
7/30/97	11:14	2096.54	0.33	28.7	29.1	23.3	5.6	31.8	31.2	4615020	RP	Sample/Stop Run 105
7/30/97	11:56	2097.21	0.33	28.7	29.1	23.3	5.6	32	31.4	4614430	RP	Start Run 106
7/30/97	13:07	2098.37	0.33	28.6	29	23.2	5.6	30.6	31.5	4616860	RP	Sample
7/30/97	16:06	2101.32	0.33	28.5	28.9	22.5	6.2	29.7	31	4622920	RP	Sample
7/31/97	9:01	2117.44	0.33	29.3	29.7	20.7	8.8	29.4	29.7	4655790	RP	Sample

<sup>1</sup>TM Tr Me r e re ure  
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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
7/31/97	12:12	2120.53	0.33	29.2	29.7	20	9.5	29.9	29.1	4661930	RP	Sample/Stop Run 106
7/31/97	12:56	2121.25	0.33	29.1	29.6	19.9	9.5	28.7	29.3	4663370	RP	Start Run 107
7/31/97	13:44	2122.02	0.33	29.2	29.7	19.7	9.8	29	29.2	4664880	RP	Sample
7/31/97	15:53	2124.09	0.33	29.1	29.6	19.7	9.7	29.5	29.1	4669020	RP	Sample
8/1/97	10:15	2126.73								4674130	RP	Power off/Restart
8/1/97	11:04	2127.53	0.33	29.1	29.6	18.8	10.6	29.5	28.4	4675680	RP	Sample
8/1/97	13:26	2129.86	0.33	29.2	29.7	18.3	11.2	28.3	27.9	46801900	RP	Sample/Stop Run 107
8/1/97	13:42	2130	0.33	29.4	29.8	18	11.6	28.2	27.9	4680590	RP	Start Run 108
8/1/97	14:03	2130.44	0.33	29.1	29.6	16.4	13	30	30.3	4681310	RP	Sample
8/2/97	10:30	2133								4681688	RP	Restart
8/3/97	12:30	2157.98	0.33	29.8	30.3	12	18.1	24.6	22.7	4731690	RP	Sample/Stop Run 108
8/4/97	10:26	2158.02								4731720	RP	Restart
8/4/97	10:46	2158.25	0.33	29.9	30.2	12	18.05	24.3	27.7	4732070	RP	Sample
8/4/97	12:45	2159.54	0.33	30.9	31.3	28.4	2.7	29.1	28.9	4738740	RP	Restart After Citrus Clean
8/4/97	16:27	2163.11	0.33	30.7	31.1	28.3	2.6	29.1	29.4	4745960	RP	Start Run 109
8/4/97	16:45	2163.4	0.33	30.6	31	28	2.8	29.2	28.9	4746560	RP	Sample
8/5/97	8:57	2179.23	0.33	30.7	31.1	27.9	3	29.5	28.9	4778900	RP	Sample
8/5/97	12:20	2182.61	0.33	30.7	31.1	28	2.9	29.9	29	4785820	RP	Sample
8/5/97	15:47	2185.92	0.33	30.9	31.3	28.3	2.8	30	29.3	4792540	RP	Sample/Stop Run 109
8/5/97	16:45	2186.85	0.33	30.8	31.2	28.1	2.9	29.4	29.3	4794490	RP	Start Run 110/Sample
8/5/97	18:45	2188.81	0.33	30.7	31.1	28	2.9	28.8	28.6	4798480	RP	Sample

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TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
8/6/97	9:53	2203.57	0.33	30.9	31.2	27.8	3.3	29.4	29	4828360	RP	Sample
8/6/97	13:15	2206.78	0.33	28.5	29	25.8	3	28.8	28.5	4834760	RP	Sample/Stop Run 110
8/6/97	13:40	2207.21	0.33	28.4	28.8	25.6	3	28.3	28.4	4835580	RP	Start Run 111
8/6/97	14:30	2207.61	0.33	28.8	29.3	26.1	3	28.2	28.3	4836390	RP	Sample
8/6/97	16:37	2209.71	0.33	28.9	29.4	25.3	3.9	34.2	34.4	4840440	RP	Sample/Change Feed Rate
8/7/97	8:44	2225	0.33	28.2	28.7	24.4	4.1	33.2	33.6	4874540	RP	Sample
8/7/97	12:51	2228.89	0.33	28	28.5	24.2	4.1	32.7	33.6	4883120	RP	Sample/Stop Run 111
8/7/97	13:07	2229.16	0.33	27.8	28.3	24.1	4	32.9	33.2	4883720	RP	Start Run 112
8/7/97	13:46	2229.73	0.33	28.5	28.9	24.6	4.1	33.6	33.4	4884930	RP	Sample
8/7/97	16:45	2231.27	0.33							4888310	RP	Power Off/Auto Off
8/8/97	8:35	2231.27	0.33							4888310	RP	Restart/Auto On
8/8/97	9:12	2231.91	0.33	28.8	29.2	24.8	4.2	33.4	34	4889680	RP	Sample
8/8/97	11:41	2234.28	0.33	28.1	28.5	24	4.3	33.3	33.8	4894870	RP	Sample
8/8/97	13:20	2235.92	0.33	28.2	28.6	24.3	4.1	33.4	33.5	4898530	RP	Sample/Stop Run 112
8/10/97	10:45	2279.01	0.33	28.3	28.8	24.4	4.2	32.4	34.5	4992300	RP	Start Run 113/Sample
8/11/97	8:48	2299.31								5035690	RP	Power Off/Restart
8/11/97	10:34	2301.02	0.33	28.7	29.1	24	4.9	31.8	33.5	5039330	RP	Sample/Stop Run 113
8/11/97	10:53	2301.33	0.33	28.6	29	24	4.8	31.1	34.2	5040000	RP	Start Run 114
8/11/97	11:34	2302	0.33	28.4	28.9	24	4.7	31.3	33.4	5041430	RP	Sample
8/11/97	15:20	2305.18	0.33	30.4	31	25.7	5	33.9	35	5048280	RP	Sample
8/12/97	8:39	2322.03	0.33	30.2	30.6	24.8	5.6	33.2	34.6	5085540	RP	Sample

<sup>1</sup>TM Tr Me r e re ure  
l e u Me ure e F i r e T i e r g u e f r u r i e

TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
8/12/97	11:11	2324.49	0.33	29.9	30.3	24.3	5.8	32.6	34.4	5090880	RP	Sample/Stop Run 114
8/12/97	11:44	2325.03	0.33	28.6	29	23.2	5.6	31.4	33.6	5092020	RP	Start Run 115
8/12/97	12:15	2325.54	0.33	29.9	30.3	24.4	5.7	31.9	34.6	5093180	RP	Sample
8/12/97	13:56	2327.2	0.33	30.1	30.5	24.3	6	33	34.5	5096790	RP	Sample
8/13/97	11:34	2348.23	0.33	30.3	30.7	23.3	7.2	31.2	33.4	5142530	RP	Sample
8/13/97	11:55	2348.69	0.33	30.4	30.9	23.3	7.4	32.5	33.3	5143490	RP	Stop Run 115
8/13/97	13:13	2349.92	0.33	30.5	31	23.2	7.6	31.7	33.6	5146120	RP	Start Run 116
8/13/97	14:00	2350.71	0.33	30.5	31	23.2	7.6	31.4	33.2	5147790	RP	Sample
8/13/97	16:27	2353.11	0.33	30.6	31	21.7	9.1	30.7	32.2	5152890	RP	Sample
8/14/97	8:23	2368.64	0.33	30.2	30.7	21.5	9	32.2	33.5	5186490	RP	Sample
8/14/97	12:38	2372.81	0.33	29.8	30.2	21.3	8.7	31.7	33.7	5195500	RP	Sample/Stop Run 116
8/14/97	13:00	2373.15	0.33	29.9	30.3	21.4	8.7	32	33.5	5196220	RP	Start Run 117
8/14/97	13:50	2373.96	0.33	30.1	30.6	21	9.4	31.8	33.6	5197950	RP	Sample
8/14/97	16:04	2376.15	0.33	30.7	31.1	19.8	11.1	31.1	32.4	5202530	RP	Sample
8/15/97	11:17	2394.95	0.33	30.8	31.1	16.7	14.25	28.3	29.9	5241050	RP	Sample/Stop Run 117
8/15/97	15:20	2398.28	0.33	30.7	31.1	19.3	11.6	30.2	32.5	5249010	RP	Start Run 118
8/15/97	16:12	2399.73	0.33	30.3	30.8	18.5	12.1	31.9	33.7	5256870	RP	Sample
8/16/97	12:04	2400.71								5252850	RP	Power Off/Restart
8/16/97	12:17	2400.94	0.33	30.8	31.2	17.1	13.9	30.3	32	5253260	RP	Sample
8/16/97	12:14	2424.31	0.33	30.7	31.2	12.4	18.6	26	27.7	5297910	RP	Sample/Stop Run 118
8/18/97	12:45	2425.45	0.33	30.4	30.8	28.3	5.3	36.4	40.2	5304340	RP	After Citric acid cleaning

<sup>1</sup>TM Tr Me r e re ure  
l e u Me ure e F i r e T i e r g u e f r u r i e

TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
8/19/97	13:00	2449.12	0.33	30.5	30.9	26.9	3.8	30.7	31	5355390	RP	Start Run 119/Sample
8/19/97	18:30	2454.38								5366000	RP	Power Off/Restart
8/19/97	18:44	2454.62	0.33	30.8	31.3	26.6	4.5	29.4	32.3	5366420	RP	Sample
8/20/97	9:54	2469.43	0.33	30.6	31	26.3	4.5	29.1	31.6	5396300	RP	Sample
8/20/97	14:15	2473.69	0.33	30.6	31.1	26.4	4.5	28.7	31.3	5404880	RP	Sample/End Run 119
8/20/97	15:04	2474.48	0.33	30.6	31.1	26.4	4.5	29.8	30.5	5406470	RP	Start Run 120
8/20/97	16:33	2475.93	0.33	29.7	30	24.2	5.7	35.9	37.9	5409790	RP	Sample
8/21/97	10:15	2476.76	0.33	30.6	31	24.9	5.9	36	38.9	5411760	RP	Power Off/Restart
8/21/97	11:22	2477.91	0.33	29.7	30.2	24.1	5.9	37	39	5414510	RP	Sample
8/21/97	13:55	2480.21	0.33	29.3	29.8	23.5	6.1	35.9	38.2	5419960	RP	Sample/Stop Run 120
8/21/97	14:45	2480.98	0.33	29.5	30	23.6	6.2	36.6	38.2	5421770	RP	Start Run 121
8/21/97	15:23	2481.55	0.33	29.5	30	23	6.8	36.1	37.5	5423080	RP	Sample
8/21/97	17:17	2483.28	0.33	29.6	30.1	23.6	6.3	36.1	38	5427230	RP	Sample
8/22/97	8:04	2491.66								5446890	RP	Off - Low Air/Restart
8/22/97	8:22	2491.9	0.33	30	30.6	23.5	6.8	35	37.9	5447510	RP	Sample
8/22/97	10:44	2493.87								5452160	RP	Off - Low Air/Restart
8/22/97	11:55	2494.98	0.33	29.4	29.9	22.4	7.3	35.1	37.2	5454750	RP	Sample/Stop Run 121
8/22/97	12:10	2495.17	0.33	29.7	30.2	23.3	6.7	36	38	5455210	RP	Start Run 122
8/22/97	12:45	2495.75	0.33							5456580	RP	Sample
8/24/97	9:54	2536.75	0.33	29.7	30.1	21.4	8.5	36.3	36.2	5552380	RP	Sample
8/25/97	8:22	2541.53								5563440	RP	Power Off/Restart

<sup>1</sup>TM Tr Me r e re ure  
l e u Me ure e F i r e T i e r g u e f r u r i e

**TABLE 1. MEMCOR DAILY OPERATIONAL LOG**

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
8/25/97	8:45	2541.91	0.33	30.1	30.5	22.5	7.8	35.7	36.7	5564330	RP	Sample
8/25/97	10:20	2543.48	0.33	29.5	30	21.8	8	35.9	36.4	5567950	RP	Sample/Stop Run 122
8/25/97	11:23	2544.34	0.33	29.6	30	21.3	8.5	34.8	35.9	5569930	RP	Start Run 123/Sample
8/25/97	14:17	2547.05	0.33	29.8	30.2	21	9	35.1	35.3	5576150	RP	Sample
8/26/97	7:37	2563.37	0.33	29.8	30.2	21	9	35.3	35.5	5613960	RP	Sample
8/26/97	11:15	2566.78	0.33	29.5	30	21.1	8.7	35.6	35.5	5621940	RP	Sample/Stop Run 123
8/26/97	12:00	2567.45	0.33	29.6	30.1	21.1	8.8	35.5	35.4	5623550	RP	Start 124/Sample
8/26/97	14:13	2569.48	0.33	30.1	30.5	21.3	9	35.1	35.5	5628160	RP	Sample
8/27/97	8:52	2587.63	0.33	30.2	30.8	19	11.5	33.2	33.7	5668710	RP	Sample
8/27/97	12:08	2590.83	0.33	30.5	31	18.4	12.4	32.4	31.1	5675760	RP	Sample/Stop Run 124
8/27/97	12:40	2591.34	0.33	30.4	30.8	20.3	10.3	34	34.8	5676930	RP	Start Run 125/Sample
8/27/97	15:09	2593.77	0.33	30.4	30.8	19.2	11.4	32.6	33.7	5682300	RP	Sample
8/28/97	8:19	2610.54	0.33	30.5	31	19.1	11.7	32.6	33.7	5718570	RP	Sample
8/28/97	11:16	2613.42	0.33	30.7	31	16.3	14.6	30.8	31.3	5724650	RP	Sample/Stop Run 125
8/28/97	11:42	2613.84	0.33	30.9	31.2	15.8	15.25	30.4	30.9	5725510	RP	Start Run 126/Sample
8/28/97	13:15	2615.89	0.33	30.5	30.9	19.1	11.6	31.5	31.3	5729620	RP	Sample
8/28/97	16:05	2618.1	0.33	30.5	30.8	18.2	17.5	30.4	31.2	5734120	RP	Sample
8/29/97	7:40	2633.33	0.33	31	31.4	11.5	19.7	29.1	25.1	5761300	RP	Sample/Stop Run 126 - Citric Clean
8/29/97	9:50	2634.42	0.33	30.5	31	21.6	9.2	28.9	30.7	5767260	RP	Start Run 127 - After Citric Clean
9/1/97	17:30	2690	0.33							586875	RP	Power Off/Restart
9/2/97	9:15	2690.25	0.33							5868980	RP	Power Off

<sup>1</sup>TM Tr Me r e re ure  
l e u Me ure e F i r e T i e r g u e f r u r i e

TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
9/2/97	9:30	2690.36	0.33	31.1	31.5	12.2	19.1	26.2	26.4	5869180	RP	Stop Run 127
9/3/97	13:50	2691.48	0.33	30.2	30.5	22.7	7.7	30	31.3	5874910	RP	Citric Clean/Soak
9/3/97	14:20	2691.95	0.33	30.1	30.5	31.7	8.6	30	31.1	5875820	RP	Sample/Start Run 128
9/3/97	14:40	2692.25	0.33							5876420	RP	Power Off
9/3/97	15:12	2692.26	0.33	30.9	31.3	23.3	7.8	29.3	31.4	5876450	RP	Restart
9/4/97	16:35	2717.06	0.33	30	30.5	23.3	7	30.2	31	5926060	RP	Sample/Stop Run 128
9/4/97	17:07	2717.6	0.33	30	30.5	23.2	7.1	28.8	31	5927170	RP	Start Run 129/Sample
9/5/97	10:00	2734	0.33	29.8	30.3	22.2	7.9	29.1	30.3	5960010	RP	Sample/Stop Run 129
9/5/97	10:35	2734.48	0.33	30.1	30.5	22.5	7.8	30.9	30.8	5961030	RP	Start Run 130/Sample
9/7/97	11:26	2779.94	0.33	29.7	30.2	21.7	8.3	28.8	30.2	6056700	RP	Sample
9/8/97	13:29	2803.71	0.33	30.1	30.5	22.4	7.9	29.1	30.8	6096880	RP	Sample/Stop Run 130
9/8/97	13:39	2803.92	0.33	30.1	30.6	22.2	8.2	29.5	30.4	6097260	RP	Start Run 131/Sample
9/9/97	18:17	2828.94	0.33	30.2	30.5	21.6	8.8	30.8	31.2	6146260	RP	Sample/Stop Run 131
9/9/97	18:39	2829.26	0.33	30.3	30.3	21.3	8.8	29.9	31.1	6146910	RP	Start Run 132/Sample
9/10/97	12:22	2846.43	0.33	30	30.5	20	10.25	29	30.5	6181010	RP	Sample/Stop Run 132
9/10/97	12:42	2846.77	0.33	30.3	30.8	20.4	10.15	29.5	30.8	6181690	RP	Start Run 133/Sample
9/11/97	9:50	2867.39	0.33	38.6	31.2	20.6	14.3	29.7	30.8	6223270	RP	Sample/Stop Run 133
9/11/97	10:17	2867.84	0.33	30.6	31.2	20.6	10.3	30	30.8	6224150	RP	Start Run 134/Sample
9/12/97	12:45	2877.37	0.33	30.7	31.4	22	9.05	29.6	32.3	6243240	RP	Sample/Stop Run 134
9/12/97	13:17	2877.87	0.33	30.4	30.9	20.8	9.85	30.1	31.2	6244200	RP	Start Run 135/Sample
9/14/97	9:12	2901.45	0.33	30.6	31.1	21	9.85	28.3	31.3	6289970	RP	Power Off/Restart

<sup>1</sup>TM Tr Me r e re ure  
l e u Me ure e F i r e T i e r g u e f r u r i e

TABLE 1. MEMCOR DAILY OPERATIONAL LOG

Date	Time	Hour Run Meter	Backwash Interval	Feed Pressure (psig)	Recirc. Pressure (psig)	Filtrate Pressure (psig)	TMP <sup>1</sup> (psig)	Feed <sup>2</sup> GPM	Filtrate <sup>2</sup> GPM	Filtrate Totalizer (GAL)	Operator Initials	Comments
9/14/97	9:25	2901.64	0.33	30.6	31.1	20.1	10.75	28.5	31	6290300	RP	Sample (1 Pump)
9/15/97	13:22	2926.65	0.33	29.8	30.1	18.6	11.35	27.3	30.3	6337880	RP	Sample/Stop Run 135
9/17/97	15:52	2954.34	0.33	30.2	30.7	21.1	9.35	29.3	31.9	6392740	RP	Power Off/Restart
9/18/97	9:17	2964.66	0.33	78	78.4	19	9.2	28.4	30.7	6413920	RP	Shutdown
9/18/97	14:30	2964.66	0.33							6413920	RP	Restart
9/19/97	8:10	2967.55	0.33							6419756	RP	Low Air-Reset Air Compressor

<sup>1</sup>TMP Temperature  
<sup>2</sup>Feed/Filtrate Flow Rate

**TABLE 2. MEMCOR MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning			Influent		Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput Gallons	Total Phosphorus	TSS	Flux GPD/ft <sup>2</sup>	TMP (psig)	Total Phosphorus
						Conc. (mg/L)	Conc. (mg/L)			Conc. (mg/L)
2	10/30/96	3.36	None	0	10080	0.103	10			0.08
3	10/31/96	5.98	None	0	17940	0.045	0.81	89.0	7.55	0.035
4	11/1/96	6.36	None	0	19080	0.011	<1	89.0	7.05	0.007
5	11/4/96	6.23	None	0	18690	0.047	10	89.0	8.15	0.027
6	11/5/96	4.26	None	0	12780	0.046	13.8	89.0	8.3	0.027
7	11/6/96	6.11	None	0	18330	0.013	3	89.0	8.45	0.006
8	11/7/96	4.53	None	0	17200	0.01	2	112.6	8.05	0.006
9	11/8/96	6	None	0	17930	0.023	1	88.6	8.15	0.02
10	11/11/96	5.99	None	0	19090	0.075	7	94.5	9.33	0.067
11	11/12/96	6.56	None	0	17470	0.06	16	79.0	10.5	0.022
12	11/13/96	6.48	None	0	19440	0.06	22	89.0	10.63	0.025
13	11/14/96	4.47	None	0	12605	0.02	1	83.6	10.07	0.016
14	11/15/96	6.02	None	0	16976	0.025	1	83.6	10.45	0.017
15	11/18/96	5.56	None	0	15679	0.046	6	83.6	11.13	<0.006
16	11/19/96	5.67	None	0	15989	0.11	22	83.6	13.9	0.052
17	11/20/96	6.34	None	0	17879	0.086	29	83.6	11.4	0.038
18	11/21/96	6.02	None	0	16976	0.027	2	83.6	12.4	0.011
19	11/22/96	3.06	None	0	8629	0.07	1	83.6	11.75	0.056
20	1/2/97	4	FeCl3	8.18	10800	0.014	<5.0	80.1	11.13	<0.006
21	1/8/97	4.72	FeCl3	20.12	13120	0.013	<5.0	82.4	11.83	<0.006
22	1/9/97	4.51	FeCl3	14.31	12300	0.014	<5.0	80.9	14.45	<0.006
23	1/10/97	4.65	FeCl3	13.14	11970	0.03	<5.0	76.3	17.83	<0.006
24	1/13/97	2.47	FeCl3	15.07	5840	0.013	<5.0	70.1	20.15	<0.006
25	1/14/97	6.89	FeCl3	8.51	20680	0.022	<5.0	89.0	20.6	<0.006
25a	1/16/97	4.75	FeCl3	4.53	19410			121.2	20.75	

C e i C e i g  
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 N e T M T r M e r e r e u r e

**TABLE 2. MEMCOR MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning			Influent		Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput Gallons	Total Phosphorus	TSS	Flux GPD/ft <sup>2</sup>	TMP (psig)	Total Phosphorus
						Conc. (mg/L)	Conc. (mg/L)			Conc. (mg/L)
25b	1/20/97	7.41	None	0	27220			108.9	16.08	
26	1/29/97	4.44	FeCl3	6.95	12670	0.06	<15	70.7	7.87	<0.006
27	1/30/97	6.06	FeCl3	5.04	17460	0.06	11	71.4	12.07	<0.006
28	1/31/97	7.93	FeCl3	6.39	27540	0.056	8.7	86.1	16.6	<0.006
29	2/5/97	5.5	FeCl3	9.09	15600	0.02	<5.0	70.3	8.4	<0.006
30	2/6/97	6.05	FeCl3	2.59	16970	0.09	10	69.5	11	0.017
31	2/7/97	6.08	FeCl3	2.54	17330	0.044	10	70.6	11.45	0.006
32	2/10/97	6.45	FeCl3	2.39	18410	0.044	8.3	70.7	11.45	0.006
33	2/11/97	6.37	FeCl3	2.4	18350	0.018		71.4	11	0.006
34	2/12/97	5.19	FeCl3	3.02	14550	0.02	<5.0	69.5	10.7	0.006
35	2/13/97	6.27	FeCl3	2.4	18340			72.5	10.63	
36	2/14/97	6.3	FeCl3	2.59	17010	<0.006	<5.0	66.9	10.13	0.017
37	3/21/97	1.5	FeCl3	2.7	4070	0.025	<5.0	67.2	12.35	0.0067
38	3/24/97	5.45	FeCl3	2.15	15340	0.022		69.8	15.64	0.008
39	3/25/97	4.95	FeCl3	2.28	19330	0.021	<5.0	96.8	10.4	0.027
40	3/26/97	4.39	FeCl3	2.62	12610			71.2	12	
41	3/27/97	6.98	FeCl3	2.59	16960			60.2	13.33	
42	4/1/97	8.03	None		20720			63.9	14.25	
42a	4/2/97	5.96	None		15180			63.1	14.9	
43	4/4/97	4.6	None		11940			64.3	16.5	
43a	4/7/97	6.44	None		20170			77.6	8.6	
44	4/8/97	10.19	None		34440			83.8	5.2	
45	4/10/97	16.2	None		34590	0.02		52.9	12.4	0.011
46	4/11/97	26.9	None		70050	0.011	<5.0	64.5	14.6	0.01
46a	4/14/97	60.08	None		148730			61.4	19.6	

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**TABLE 2. MEMCOR MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning			Influent		Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput Gallons	Total Phosphorus	TSS	Flux GPD/ft <sup>2</sup>	TMP (psig)	Total Phosphorus
						Conc. (mg/L)	Conc. (mg/L)			Conc. (mg/L)
47*	4/16/97									
48	4/17/97	24.75	None		69340	0.022	5.7	69.4	8.5	0.0078
49**	4/22/97	79.14	None		220170	0.029	<5.0	68.9	9	0.014
50	4/23/97	23.01	None		62110	0.028	6.7	66.9	9.75	0.015
51	4/24/97	9.82	Alum	1.9	26270	0.029	<5.0	66.3	11.7	0.011
52	4/25/97	19.47	Alum	2.8	61600	0.022	<5.0	64.0	12.5	0.011
52a	4/26/97	23.24	Alum	1.8	58150			62.0	13.05	
52b	4/28/97	39.67	Alum	1.2	111210			69.5	13.45	
53	4/29/97	14.72	Alum	3.6	44460	0.024		62.9	14.25	0.0085
53a	4/30/97	27.75	Alum	1.14	59030			52.7	10.8	
54	5/1/97	24.63	Alum	1.1	48960	0.016	<5.0	50.5	10.45	0.012
55	5/2/97	23.38	Alum	1	41000	0.018	<5.0	51.0	11.45	0.017
56	5/5/97	6.87	Alum	1.3	152860			47.7	20	
56a*	5/7/97									
57	5/9/97	24.17	Alum	0.9	48780	0.023	<5.0	49.5	6.5	0.013
58	5/12/97		Alum	1.1	136900			48.4	8.9	
59	5/13/97	23.83	Alum	3.2	44140	0.02	<5.0	45.9	13.6	0.016
60	5/14/97	19.98	Alum	3.4	38790			48.1	16.5	
61	5/15/97	23.11	Alum	3.8	42910	0.016	<5.0	46.0	16.5	0.009
63	5/20/97	23.93	Alum	3.7	48030	0.028	<5.0	49.7	7.5	0.0052
64	5/21/97	23.17	Alum	3.1	45950	0.019		49.1	8.7	0.0091
65	5/22/97	23.87	Alum	2.4	46420	0.018	7	48.2	10.2	0.0086
66	5/23/97	23.61	Alum	2.6	42530	0.021	5	44.6	13.4	0.007
76	6/9/97	64.66	FeCl <sub>3</sub>	1.5	128450	0.023		49.2	6.4	0.0084
77	6/10/97	12.74	FeCl <sub>3</sub>	0.88	25200	0.024		49.0	6.65	0.0044

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**TABLE 2. MEMCOR MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning			Influent		Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput Gallons	Total Phosphorus	TSS	Flux GPD/ft <sup>2</sup>	TMP (psig)	Total Phosphorus
						Conc. (mg/L)	Conc. (mg/L)			Conc. (mg/L)
78	6/11/97	24.04	FeCl <sub>3</sub>	2.8	47360	0.017		48.8	6.5	0.012
79	6/13/97	23.91	FeCl <sub>3</sub>	3.4	47310	0.019	6	49.0	7.2	0.0066
80	6/13/97	23.42	FeCl <sub>3</sub>	3.4	46060	0.017	<5.0	48.7	7.49	0.0076
82	6/17/97	23.08	FeCl <sub>3</sub>	5.76	45490	0.022		48.8	29	0.0097
83	6/18/97	20.88	FeCl <sub>3</sub>	3.6	41570	0.016		49.3	28.4	0.0045
84	6/19/97	23.38	FeCl <sub>3</sub>	4.3	46010	0.014	6.5	48.8	8.3	<0.004
85	6/30/97	52.62	FeCl <sub>3</sub>	3.16	96080	0.022		45.3	2.1	<0.004
86	7/1/97	24.02	FeCl <sub>3</sub>	8.4	50200	0.03	5	51.8	2.55	0.0054
87	7/2/97	22.04	FeCl <sub>3</sub>	9.1	46290	0.014		52.1	2.65	<0.004
88	7/3/97	23.46	FeCl <sub>3</sub>	7.7	49530	0.024	7	52.3	2.8	<0.004
89	7/7/97	48.02	FeCl <sub>3</sub>	7.8	102320	0.052		52.8	2.8	<0.004
90	7/8/97	20.92	FeCl <sub>3</sub>	11.5	43390	0.098	9.5	51.4	2.7	0.01
91	7/9/97	20.02	FeCl <sub>3</sub>	9	42050	0.071		52.1	2.8	0.0078
92	7/10/97	23.94	FeCl <sub>3</sub>	9.4	51030	0.081	<5	52.8	3.1	0.0054
93	7/11/97	24.27	FeCl <sub>3</sub>	10	51290	0.048	<5	52.4	3.4	0.0084
94	7/14/97	24.53	FeCl <sub>3</sub>	9	52140	0.019		52.7	3.5	0.0071
95	7/15/97	24.23	FeCl <sub>3</sub>	8.9	51340	0.024	<5	52.5	3.5	<0.004
96	7/16/97	1.52	FeCl <sub>3</sub>	9	2220			36.2	3.5	
97	7/17/97	20.57	FeCl <sub>3</sub>	9	43370	0.02	<5	52.3	3.5	<0.004
98	7/18/97	6.47	FeCl <sub>3</sub>	8	14420	0.022	<5	55.2	3.5	<0.004
100	7/22/97	23.74	FeCl <sub>3</sub>	7.9	49720	0.021	9	51.9	3.8	0.0055
101	7/23/97	22.56	FeCl <sub>3</sub>	8	47410	0.02		52.1	3.9	0.01
102	7/24/97	23.79	FeCl <sub>3</sub>	7.5	50100	0.017	11	52.2	4	0.0055
103	7/25/97	20.77	FeCl <sub>3</sub>	7.6	43600	0.026	7	52.0	4.1	0.0042
104	7/28/97	40.66	FeCl <sub>3</sub>	10.6	83970	0.073		51.2	4	0.0073

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**TABLE 2. MEMCOR MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning			Influent		Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput Gallons	Total Phosphorus	TSS	Flux GPD/ft <sup>2</sup>	TMP (psig)	Total Phosphorus
						Conc. (mg/L)	Conc. (mg/L)			Conc. (mg/L)
105	7/30/97	14.35	Alum	5.3	31870	0.091	5	55.0	5.1	0.0076
106	7/31/97	23.32	Alum	2.5	47500	0.077	6	50.5	6.2	0.01
107	8/1/97	8.61	Alum	3.6	16820	0.079	<5	48.4	10.6	0.013
108	8/4/97	27.98	Alum	4.4	51100	0.092		45.3	13	0.0065
109	8/5/97	22.81	Alum	2.2	46580	0.14	6	50.6	2.8	0.018
110	8/6/97	19.93	Alum	9.2	40270	0.031		50.1	2.9	0.02
111	8/7/97	21.68	Alum	6.3	47540	0.053	<5	54.3	3	0.0062
112	8/8/97	6.76	Alum	5.9	14810	0.084	<5	54.3	4.1	0.0093
113	8/11/97	22.01	Alum	15.5	47030	0.057		53.0	4.2	<0.004
114	8/12/97	23.16	Alum	4.3	50880	0.052	<5	54.4	4.7	0.0059
115	8/13/97	23.66	Alum	4.2	51470	0.068		53.9	5.7	0.0077
116	8/14/97	22.89	Alum	8.3	49380	0.055	8	53.5	7.6	0.013
117	8/15/97	21.8	Alum	14.9	44830	0.061	6	51.0	9.4	0.0073
118	8/18/97	26.03	Alum	7.5	48900	0.051		46.6	11.6	0.01
119	8/20/97	24.57	PAC	5.3	49490	0.072	<5	49.9	3.8	0.0054
120	8/21/97	5.73	PAC	6.3	13490	0.058	6	58.3	4.5	0.0098
121	8/22/97	14	PAC	5.5	32980	0.083	<5	58.4	6.2	0.0091
122	8/25/97	48.31	PAC	5.7	112740	0.1		57.8	6.7	0.017
123	8/26/97	22.44	PAC	5.5	52010	0.2	<5	57.4	8.5	0.016
124	8/27/97	23.38	PAC	5.6	52210	0.088		55.3	8.8	0.012
125	8/28/97	22.08	PAC	6.7	47720	0.051	7	53.6	10.3	0.02
126	8/28/97	19.49	PAC	6.7	35790	0.065	6	45.5	11.6	<0.004
127	9/2/97	55.94	PAC	5.5	101920	0.053		45.2	9.2	<0.004
128	9/4/97	25.11	None		50240	0.067	5	49.6	8.6	<0.004
129	9/5/97	16.4	None		32840	0.049	7	49.6	7.1	<0.004

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**TABLE 2. MEMCOR MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning			Influent		Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput Gallons	Total Phosphorus	TSS	Flux GPD/ft <sup>2</sup>	TMP (psig)	Total Phosphorus
						Conc. (mg/L)	Conc. (mg/L)			Conc. (mg/L)
130	9/8/97	69.23	None		135850	0.094	<5	48.6	7.8	0.0097
131	9/9/97	25.02	None		49000	0.34	<5	48.5	8.2	0.0084
132	9/10/97	17.17	None		34100	0.077	<5	49.2	8.8	0.016
133	9/11/97	20.62	None		41580	0.072	<5	50.0	10.15	0.011
134	9/12/97	9.53	None		19090	0.048	<5	49.6	10.3	0.023
135	9/15/97	48.78	None		93680	0.044	8	47.6	9.85	0.025

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
19 M r	11 10			8	8	10	1	0.		10	10	1 8 60.	7	16	0	L	
19 M r	1 0			8.		10	1	0.		10	10	1 86960.	7	16	0	L	
19 M r	1			10.	10.	10	1	.7		10	10	1 91160.	7	16	0	L	
19 M r	0	10 000	.	6.	7	10	1	.9		6	6	1 98160.	76	16	0	L	
19 M r	6 10	0	0	10	11	10	1	.8		10	0	1 98 31.	76	16	0	L	Re i r u i M e
0 M r	10 0	0	0	11.	1	10	1	3.		10	0	1 98 31.	80	16	0	L	i i Re i r u i M e
0 M r	3 00	0	0	1	1	10	1	3.		10	0	1 98 31.	8	16	0	L	Re i r u i M e
1 M r	11 00	0	0	11.	1	10	1	3.8		9	0	1 98 31.	8	16	0	L	Re i r u i M e
1 M r	11 30	10 000	.	1	1	10	1	.		9.	9.	1 019 8.3	86	16	0. g	L	Fee Bee
1 M r	3 00	10 000	.	1	16	10	1	.3		9	9	1 0 077.1	86	16		L	E 37
M r	8 00	10 000	.	13.		10	1			10	10	1 0 077				L	Ru 38
M r	10 00	10 000	.	11.		10	1	3.		10	10	1 0 189	78	16	0.	L	
M r	30	10 000	.	11.	13.	10	1	3.		10	10	1 09313.8	76	16	0.	L	
M r	3 30	10 000	.	11.	13	10	1	3.		10	10	1 10 76.9	76	16	0.	L	Ru 39
M r	11 1	10 000	.							10	10	1 113 6.	80	16	0.	L	
M r	11 30	10 000	.	11	1	10	1	3.		10	10	1 1139 .	80	16	0.	L	
6 M r	10 00	10 000	.	10	10	10	1	3		10	10	1 1 8 .	80	16		L	Re i r u i r U
6 M r	3 30	10 000	.	11.	1	10	1	3.		10	10	1 313	76	16	0.	L	Ru 0
7 M r	9 00	10 000	.	11.	13	10	1	3.		10	10	1 780 .	8	16	0	L	Re i r u i re r U / Ru 1
7 M r	00	10 000	.	13.	1	10	1	3.		10	10	1 36	8	16	0.	L	
7 M r	3 30	10 000	.	13	1	10	1	3.		10	10	1 39600.8	8	16	0.	L	Ru
1 A r	9 30	10 000	.	11	1	10	1	3.		10	9.	1 010.	7	16	0.	L	
1 A r	1	10 000	.	13	1	10	1	3.		10	10	1 888 .9	76	16	0.	L	
1 A r	1	10 000	.	1 .	1	10	1	3.		10	10	1 61.9	76	16	0.	L	Ru
A r	10 1	10 000	1.	1 .	1	1	10	3.		10	10	1 39.9	76	16	0.	L	
A r	11 30	10 000	1.	1 .	1	1	10	3.		10	10	1 78 .	76	16	0.	L	
A r		10 000	1.	13	1	1	10	3.		10	10	1 6 63.	7	16	0.	L	Ru 3

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed								Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments	
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)						Totalizer Reading (liters)
3 A r	1 10	10 000	1.	13	16	1	10	3.		10	10	1 7086 .	70	16	0.	L	
3 A r	3 1	10 000	1.	13	1	1	10	3.		10	10	1 777 9.9	70	16	0.	L	
A r	10 10	10 000	1.	13	1	1	10	3.		10	10	1 80877.9	70	16	0.	L	
A r	00	10 000	1.	1 .	13.	1	10	3.		10	10	1 898 9.9	70	16	0.	L	
A r	3 30	10 000	1.	1	17	1	10	3.6		10	10	1 9 69.	70	16	0.	L	Ru
8 A r	1 00	10 000	1.	1	13	1	10	3.		10	10	1 966 0.	70	16	0.	L	
8 A r	3 30	10 000	1.	1 .	13.	1	10	3.6		10	10	160 6	76	16	0.	L	
9 A r	9	10 000	1.	13	1	1	10	3.		10	10	160 6	78	16	0.	L	
9 A r	3 00	10 000	1.	1	1 .	1	10	3.		10	9.	16168 .7	78	16	0.	L	Ru
10 A r	1 10	10 000	1.	13	1	1	10	3.		10	10	16391 .7	76	16	0.	L	Ru 6
11 A r	1 30	10 000	0.	13.	1	1	10	3.		10	10	16 18	76	16	0.	TH	
11 A r	30	10 000	0.	13.	1	1	10	3.		10	9.	16 7 76.					Ru 6
1 A r	1 3	10 000	0.	1	16.	1	10	3.		10	10	1697 3	77	16	0.	TH	Ru 7
1 M	1 0	10 000	0.	13.	1 .	1	10	3.		10	10	1703837.					
1 A r	1 1	10 000	0.	1	1 .	1	10	3.		10	9.	171 8 6	78	16	0.	TH	Ru 7
16 A r	11 30	10 000		1 .	16	1	10	3.		10	10	17 6896	71	16	0.	TH	U i Off E e n i r e /Ru 8
16 A r	16	10 000	0.	1 .	16.	1	10	3.		9.8	9.8	1731663	7	16	0.	TH	
17 A r	16 00	10 000	0.	16	17	1		3.		10	9.	17 7 68	7	16	0.	TH	Ru 9
18 A r	13 00	10 000	0.	16	17	1		3.		10	9.	1766 6	70	16	0.	TH	Re i r u i g
19 A r	17 00	10 000		16	17.	1		3.		10	9.	1771069.8				TH	Re i r u i g
1 A r	11	10 000	0.	1	16	1		3.		10	9.	1771077	7	16	0.	TH	r f r Bi A e
1 A r	1 30	10 000		16	17	1		3.		10	9.	177 916.	7	16	0.	TH	Re i r u i g
A r	9 3	10 000		13	1	1	10	3.		10	9.	177 916.	77	16	0.	R	Re e
A r	6 00	10 000		1 .	13.7	1	10	3.		10	9.	177 916.	81.	1 .	0.	R	
3 A r	8	1 000		1 .7	1	1	10			10	9.	1773118.	81	1 .	0.	R	r C e . Fee / Ru 0
3 A r	9	1 000		1	13.	1	10			10	9.	177 13 .				R	Re e
3 A r	17 7	1 000		1	13	1	10			10	9.	177 13 .	8	1	0.	R	Re e / Ru 1

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed								Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments	
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)						Totalizer Reading (liters)
A r	9 07	1 000		1 .	1	1	10			10	9.	177 13 .	7	1 .7	0.	R	Off Re ir u i g
A r	16 09	1 000		1	13	1	10			10	9.	177 13 .	76	1 .	0.	R	Re ir u i g/Ru
A r	9 3	1 000		11	1 .	1	10			9.	9	177 180.8	77	1 .	0.	R	r /C e .Fee A O
A r	1 8	1 000		13	1	1	10			10	9.	1780673.9	7	1 .	0.	R	Re e
A r	16 0	1 000		1 .	1	1	10			10	9.	1780673.9	76	1 .	0.	R	Re ir u i g/Ru
6 A r	16 00	1 000		11	1	1	10			10	9.	1780673.9	7	1 .	0.	R	i g/Ce i g
6 A r	18 1	1 000		11		1	10			10	9.	1780673.9	7	1 .	0.	R	AferCe i g/Ru
8 A r	8 38	1 000		11		1	10	17		10	9.	1780673.9					
8 A r	13 00	1 000	0.6	11		1	10			9.	9	17876 3.8	78	1 .	0.	R	r Ru 3
8 A r	13 33	1 000	0.6	11.		1	10			9.	9	178876 .	77	1 .	0.	R	Ru 3
8 A r	1 13	1 000	0.6		13	1	10			9.	9	1790100	77	1	0.	R	
8 A r	17 3	1 000	0.6		13	1	10			10	9.	179 763.	78	1	0.	R	
8 A r	18 1	1 000	0.6	13	1	1	10			9.	9	1797 67.8	78	1	0.	R	
9 A r	6 0	1 000	0.7	1 .7	1	1	10			10	9.	18189 .	76	1 .	0.	R	e Bei gT e
9 A r	1 07	1 000	0.7	13	1	1	10	3.		10	9.	1830068.7	7	1	0.	R	Her i e e e
9 A r	13 00	1 000	0.7	1	1	1		3		10	9.	183 0 6.	76	1	0.	R	C geF /E Ru 3
9 A r	1 10	1 000	0.7	1 .	1 .	1				10	9.	183 100.	76	1	0.	R	
9 A r	17 0	1 000										18360 1.7				R	e Re ir u i g
30 A r	1	1 000										18360 1.7				R	Dr i frCe i g/Ciri Ai Ce
30 A r	1 3	1 000		8.7	8.9	1	10	.		10		18360 1.7	77	1	0.	R	er e eFu Te
30 A r	16	1 000		8.	8.	1	10	.		10		18360 1.7	78	1	0.	R	e Fu Te ef reCe i g
1 M	13 0	1 000		7.	7.	1	10	.1		10		18360 1.7	80	1	0.	R	Le i /AferC e .Ce
1 M	1 0	1 000	0.7	7.7	8.	1	10	.1		10	9.	1836 19.	81	1	0.	R	C e .Fee 3/ r Ru
1 M	16 9	1 000	0.7	8	9	1	10	.1		10	9.	18 0093	8	1	0.	R	Gr e/C e .Fee 1
M	9 31	1 000		9.	10.	1	10	.		10	9.	1867863.	79	1	0.	R	C e .Fee Ou
M	9	1 000	0.	9.	10.	1	10	.		10	9.	1868 0	79	1	0.	R	Re r C e .Fee 39
M	13 0	1 000	0.	9.	10.	1	10	.		10	9.	187 779.	80	1	0.	R	E Ru

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
M	1	1 000	0.	9.7	10.	1	10	.		10	9.	1876393.	81	1	0.	R	C e .Fee 38.
3 M	17 30	1 000		10.	11.	1	10	.3		10	9.	19 0083	81	1	0.	R	C e .Fee 38. / Ru 6
M	00	1 000		10.	1	1	7.	.		10	9.	196 763	81	1	0.	R	C ge Fre . 7. Mi /Ru 6
M	11 17	1 000		11	1 .	1	7.	.		10	9.	19866 8.	78	1	0.	R	u i Re ir u i
M	16 07	1 000		10.	1	17.	7.	.		10	9.	198711 .	79	1	0.	R	u eDur i 17. e
M	17 07	1 000		11	11.	17.	7.	.		10		198711	80	1	0.		
M	19 09	1 000		11	1	17.	7.	.		10		198711	80	1	0.		
7 M	1 7	1 000	0.9	10.7	1	17.	7.	.		10	9.	19871 0.1	80	1	0.	R	C e .Fee 39. / 70 T70
7 M	16 7	1 000	0.9	9	10.	17.	7.	.		10	9.	19889 7.6	80	1	0.	R	u /N F Re re
7 M	17 00	1 000	0.9	10	11.	17.	7.	.		10	9.	1989 18	80	1	0.	R	C e .Fee 37.6
8 M	11 00	1 000	0.9	11.	1	17.	7.	.		10	9.	017 8 .9	76	1	0.	R	r Au er/ r Ru 7
8 M	1 6	1 000	0.9	11.	1 .	17.	7.	.		10	9.	0 73 .	76	1	0.	R	C e .Fee
8 M	17 10	1 000	0.9	11.	1 .	17.	7.	.		10	9.	0 7 8.8	77	1	0.	R	C e .Fee
9 M	10	1 000	1.1	11.	13	17.	7.	.6		10	9.	0 69	76	1	0.	R	1/ e 1 .
9 M	1 3	1 000	1.1	11	1 .	17.	7.	.		10	9.	0 81	77	1	0.	R	C e .Fee 1 .7/E Ru 7
11 M	30	1 000	1.1	11.	13	17.	7.	.		10	9.	1 1339	80	1	0.	R	C e .Fee .
1 M	1 10	1 000	3.	1 .7	13.	17.	7.	.6		10	9.	16 7	77	1	0.	R	r Au er/ r Ru 9
1 M	13	1 000	3.	1 .	13.	17.	7.	.6		10	9.	168 16.1	77	1	0.	R	C e .Fee 10.
1 M	16 0	1 000	.3	1 .	13.	17.	7.	.6		10	9.	171673	77	1	0.	R	C e .Fee 7.
1 M	0 1	1 000		13	13.	17.	7.	.6		10	9.	1783 8.	77	1	0.	R	C e .Fee 38.7
13 M	9 9	1 000		13.	1 .	17.	7.	.6		10	9.	199370.7	7	1	0.	R	C e .Fee 38.7
13 M	9 39	1 000	.6	1	13.7	17.	7.	.6		10	9.	1996	7	1	0.	R	C e .Fee i e38.7
13 M	9 9	1 000	.6	13.	1 .	17.	7.	.6		10	9.	00038.8	7	1	0.	R	C e .Fee 38.
13 M	1 38	1 000	.6	13.7	1 .	17.	7.	.7		10	9.	0 78.	7	1	0.	R	C e .Fee 3 .1/E Ru 9
1 M	8 0	1 000	.	1	1	17.	7.	.6		11	10	3	76	1	0.	R	C e .Fee .1/ u Bee
1 M	8	1 000	.	1	1 .7	17.	7.	.6		10	9.	3 610	76	1	0.	R	Refi C e .Fee 3.7/ r Ru 61
1 M	10 0	1 000	.	1	1	17.	7.	.6		10	9.	3766 .1	76	1	0.	R	C e .Fee 1.8

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
1 M	1 3	1 000	.	1 .	1 .	17.	7.	.6		10	9.	1 13.8	76	1	0.	R	C e . Fee 38. /E Ru 61
1 M	8 3		.6	1 .	17	17.	7.	.6		10	9.	73 3.1	80	1	0.	R	u /Re re B
1 M	9 0											73 8			0.	R	C e . Fee 7.9/Re ir. .D / erOu ge
16 M	9 10	1 000		13.7	1	17.	7.	.		10		73 87	83	1		R	r Ce / 00 Be 60 G .
16 M	11	1 000		10	10.	17.	7.	.6		10		73 87	80	1		R	Fi i C e .Ce /Re ir u e
16 M	17 0	1 000		9	9.	17.	7.	.		10		73 87	81	1		R	r C e .Fee
19 M	11 13	1 000	.6									31 06				R	u
19 M	1 3	1 000	.6	8	9.7	17.	7.	.		9		333016	76	1	0.	R	r Ru 63 Au er
19 M	1 33	1 000	.6	8.	9.7	17.	7.	.		9		338 79	79	1	0.	R	e
19 M	16	1 000	.6	8.	9.	17.	7.	.		9		3 038	80	1	0.	R	1/ e
0 M	8 6	1 000	.6	9	10	17.	7.	.		9		36 3 0	78	1	0.	R	1/ e
0 M	1 8	1 000	.6	9.	10	17.	7.	.		9		3671 8	80	1	0.	R	E Ru 63
0 M	13 00	1 000	.	9	10	17.	7.	.		9		3681 0	80	1	0.	R	r Ru 6
0 M	1 30	1 000	.	9	10	17.	7.	.		9		37036	81	1	0.	R	
1 M	1 10	000	.	9.	10.	17.	7.	.		9		0383	8	1	0.	R	E Ru 6
1 M	1 0	000	1.7	9.	10.	17.	7.	.		9		0 03	83	1	0.	R	
1 M	16 7	000	1.7	9.	10.	17.	7.	.		9		07693	8	1	0.	R	e/ r Ru 6
M	11	000	1.7	9.	10.	17.	7.	.		9		3 360	8	1	0.	R	e
M	1 3	000	1.7	9	10	17.	7.	.		9		39 9.	86	1	0.	R	E Ru 6
M	1 07	000	1.7	9	10	17.	7.	.		9		00 .	86	1	0.	R	r Ru 66
M	1 3	000	1.7	9	10	17.	7.	.		9		0637.	86	1	0.	R	e
M	16 00	000	1.7	9	10	17.	7.	.		9		1396.8	86	1	0.	R	N
M	17 00	000	1.7	9	10	17.	7.	.		9		7.	86	1	0.	R	e
3 M	13 1	000	1.7	9.	10.	17.	7.	.		9		70 .7	83	1	0.	R	Ru 66/C e .Fee N 1De r e
6 M	18 00	000	1.7	8.	9.	17.	7.	.		9		683 .3	8	1		R	Re r/ er Off Bee u Off
7 M	1 0	10 000		8.	8.	17.	7.	.		9		76783	80	1	0.	R	er Off Re r
7 M	13 0	10 000		8.7	10	17.	7.	.		9		78 83.9	8	1	0.	R	r Ru 68

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
7 M	1	10 000		9.7	10.	17.	7.			9		8039.6	83	1	0.	R	1/ e
7 M	16 3	10 000		10.	11	17.	7.			9		83 76.6	86	1	0.	R	1/ e
8 M	11 19	10 000		9	9.	17.	7.			9		99906	8	1	0.	R	1/ e
8 M	13 3	10 000		8.7	9.	17.	7.			9		60318.	8	1	0.	R	Ru 68 Fi i e
8 M	19 1	10 000	3	9	10	17.	7.			9		611 0	86	1	0.	R	r Ru 69 1/3 e
9 M	1 37	10 000	3	10	10.	17.	7.			9		6 1118.8	8	1	0.	R	1/3 e
9 M	17 0	10 000	3	10.	10.	17.	7.			9		6 31 8	8	1	0.	R	Fi i Ru 69
9 M	17 7	10 000	8.1	10.	10	17.	7.			9		6 3731.	8	1	0.	R	r Ru 69 /1/3 e
30 M	8 9	10 000	8.1	10.	10.	17.	7.			9		66 97.3	8	1	0.	R	1/3 e
30 M	16 3	10 000	8.1	9.7	10.	17.	7.			9		677 9	8	1	0.	R	Ru 69 Fi i e
30 M	17 33	10 000	1	9.7	10.	17.	7.			9		679080	8	1	0.	R	r Ru 70
31 M	8 0	10 000	1	9.7	10.	17.	7.			9		70 331	81	1	0.	R	1/3 e
31 M	10 01	10 000	1	9.	10	17.	7.			9		70398	81	1	0.	R	1/3 e
31 M	10 0	10 000	1	9.	10	17.	7.			9		70 133				R	Ru 70
u	9 30	0 000	33	9.7	10.	17.	7.			9		773680	77	1	0.	R	r Ru 7 / e
u	11	0 000		10.	10.	17.	7.			9		7769	78	1	0.	R	
3 u	8 30	0 000		10	10.	17.	7.			9		809				R	E Ru 7
3 u	16 37	0 000		10.	11	17.	7.			9		8199 1	8	1	0.	R	r Ru 73
3 u	17 0	0 000		10.	10.7	17.	7.			9		8 1009	8	1	0.	R	
u	7	0 000			9	17.	7.					83 1 9				R	erOff Re r
u	8 00	0 000		8.7	9	17.	7.			9		83 6 1	80	1	0.	R	E Ru 73
u	1 1	0 000		11.	1	17.	7.			9		8 9 6	83	1	0.	R	r Ru 7
u	17 1	0 000			1.	17.	7.			9		8 1107	83	1	0.	R	u l Re ir u e
u		0 000		11.	1.7	17.	7.			9		8 1107	8	1	0.	R	Re r/N C e .Fee
u	1 11	0 000		13	13.	17.	7.			9		8 6	83	1	0.	R	
6 u	11 09	0 000		1.	1	17.	7.			9		886980	81	1	0.	R	
6 u	11 18	0 000		1.	1	17.	7.			9		887180	81	1	0.	R	r Ru 76

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
6 u	13 16	0.000		1.	1	17.	7.	.		9		889980	8	1	0.	R	
8 u	9	0.000		1.	16	17.	7.	.		9		9 1080	8	1	0.	R	e
9 u	9 30	0.000										9687 0	80	1	0.	R	u / Ru 76/Re r
9 u	10 3	0.000		1	1.	17.	7.	.		9		970 0	80	1	0.	R	r Ru 77
9 u	1 30	0.000		1	16	17.	7.	.		9		97 97	80	1	0.	R	e
9 u		0.000		1	16.	17.	7.	.		9		977716	80	1	0.	R	e
10 u	9 9	0.000										98680				R	er ff/Re r
10 u	9 3	0.000		1		17.	7.	.		9		987068	78	1	0.	R	
10 u	10 7	0.000		1	1.	17.	7.	.		9		98916	78	1	0.	R	e/ Ru 77
10 u	11 7	0.000	1.	1	1.7	17.	7.	.		9		989780	78	1	0.	R	r Ru 78
10 u	1 6	0.000	1.	1	1.	17.	7.	.		9		9918 0	78	1	0.	R	e
11 u	9 0	0.000	1.	1.7	1.	17.	7.	.		9		30 1188	81	1	0.	R	e
11 u	11 3	0.000	1.	1.	1.	17.	7.	.		9		30 9 9	8	1	0.	R	Fi i Ru 78
11 u	1 10	0.000	0.8	1.	1.	17.	7.	.		9		30 637	8	1	0.	R	r Ru 79
11 u	13 00	0.000	0.8	1.	1.	17.	7.	.		9		30 7619	83	1	0.	R	e
11 u	1 0	0.000	0.8	1.	16.	17.	7.	.		9		3031811	8	1	0.	R	e
1 u	11 33	0.000	0.8	1.	16.	17.	7.	.		9		3061017	8	1	0.	R	e
1 u	1 0	0.000	0.8	1.	16.	17.	7.	.		9		306 681	8	1	0.	R	Ru 79
1 u	1 6	0.000	1.	1.	16.	17.	7.	.		9		3063097	8	1	0.	R	r Ru 80
1 u	1 07	0.000	1.	1.	16.	17.	7.	.		9		306 770	8	1	0.	R	e
1 u	18	0.000	1.	1.	16.	17.	7.	.	3	9		3071 68	83	1	0.	R	
13 u	8	0.000	1.	1	16	17.	7.	.		9		3086108	80	1	0.	R	er Off/Re r
13 u	9 3	0.000	1.	1	16	17.	7.	.		9		3087837	80	1	0.	R	e
13 u	13 0	0.000	1.	1	1.7	17.	7.	.		9		309 113	8	1	0.	R	e/ Ru 80
13 u	1 30	0.000		1	1	17.	7.	.		8.		3096613	8	1	0.	R	r Ru 81
13 u	16 1	0.000		1	1	17.	7.	.		8.		30976 6	8	1	0.	R	
1 u	1	0.000		1	1	17.	7.	.		8.		31 768	83	1	0.	R	Ru 81

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
1 u	13 0	0 000		1	1	17.	7.			8.		31 790	83	1	0.	R	r Ru 81
16 u	6	0 000		10.		17.	7.			8.		31393	8	1	0.	R	er ff/Re r
16 u	7	0 000		11.7	1.	17.	7.	.1		8.		31 0 17	8	1	0.	R	Ru 81
16 u	13 6	0 000		1 .7	13.7	17.	7.			8.		31 0618	83	1	0.	R	r Ru 8
16 u	1 30	0 000		13.	1.	17.	7.			8.		31 3 8	8	1	0.	R	e
16 u	17 8	0 000		13.	1.	17.	7.	.1		8.		31 8 6	8	1	0.	R	e
17 u	10 13	0 000		13.	1 .7	17.	7.			8.		3180798	8	13.	0.	R	e
17 u	13 8	0 000		13.	1 .7	17.	7.			8.		318 6	8	13.	0.	R	e/ Ru 8
17 u	13 7	0 000		13.	1 .7	17.	7.			8.		3186110	8	13.	0.	R	r Ru 83
17 u	1 0	0 000		13.	1 .7	17.	7.			8.		3187671	86	13.	0.	R	e
18 u	9	0 000		1	1	17.	7.			8.		3 163	83	13.	0.	R	e
18 u	11 09	0 000		1	1	17.	7.			8.		3 18 73	83	13.	0.	R	Ru 83
18 u	11 31	0 000		1	1	17.	7.			8.		3 19060	83	13.	0.	R	r Ru 8
18 u	1 00	0 000		1 .	1 .	17.	7.			8.		3 19793	83	13.	0.	R	e
18 u	13 8	0 000		1 .	1 .	17.	7.			8.		3 730	83	13.	0.	R	e
19 u	11 10	0 000		1 .7	1 .7	17.	7.	1.8		8.		3 13	8	13.	0.	R	e/ Ru 8
7 u	16	700		7.	7.	17.	7.			9		3 63066	8	1	0.	R	Ciri Be Ce / r Ru 8
8 u	1 0									9		3 68 01		1	0.	R	er ff/Re r
8 u	1 17	700		7.	7.	17.	7.			9		3 71 81	8	1	0.	R	e
30 u	9 3	700		8	8.	17.	7.			9		33388 8	80	1	0.	R	e
30 u	11 1	700		8	8.	17.	7.			9		33 1113	80	1	0.	R	Ru 8
30 u	11 0	700	7.	8	8.	17.	7.			9		33 18	80	1	0.	R	r Ru 86
30 u	1 3	700	7.	8	8.	17.	7.			9		33 3	81	1	0.	R	e
30 u	1 0	700	7.	8	8.	17.	7.			9		33 9	8	1	0.	R	e
1 u	8 3	700	7.	8	8.	17.	7.	.1		9		337 33	80	1	0.	R	e
1 u	1 1	700	7.	8	8.	17.	7.	.1		9		3379 00	81	1	0.	R	e/ Ru 86
1 u	1 3	700	7	8	8.	17.	7.			9		3379960	81	1	0.	R	r Ru 87

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
1 u	13	700	7	8	8.	17.	7.	.1		9		3381176	81	1	0.	R	e
u	11 18	700	7	8.	8.	17.	7.	.		9		3 1 309	8	1	0.	R	Ru 87/ e
u	11 36	700	7.	8.	8.	17.	7.	.		9		3 1 7	8	1	0.	R	r Ru 88
u	1	700	7.	8.	8.	17.	7.	.		9		3 16000	83	1	0.	R	e
u	1 07	700	7.	8.	8.	17.	7.	.		9		3 0001	83	1	0.	R	e
3 u	8 39	700	7.	8.	9	17.	7.	.		9		3 618	81	1	0.	R	e
3 u	11 0	700	7.	8.	9	17.	7.	.		9		3 0 68	83	1	0.	R	e/ Ru 88
3 u	1 00	700	7.8	8.	9	17.	7.	.		9		3 11 1	83	1	0.	R	r Ru 89
6 u	7 00		7.8									3 8 8 0		1	0.	R	er ff/Re r
7 u	1 18		7.8									3 0 03		1	0.	R	er Off/ Ru 89/Re r
7 u	13 0	190 000	11.6	8	8.	17.	7.	.3		9		3 0 0 1	79	1	0.	R	r Ru 90
7 u	1 0	190 000	11.6	8	8.	17.	7.	.3		9		3 01 67	81	1	0.	R	e
7 u	17 10	190 000	11.6	8	8.	17.	7.	.3		9		3 09368	8	1	0.	R	e
8 u	8 38	190 000	11.6	8.	8.7	17.	7.	.3		9		3 3 71	83	13.	0.	R	e
8 u	1 07	190 000	11.6	8.	8.7	17.	7.	.3		9		3 3798	8	13.	0.	R	e/ Ru 90
8 u	1 39	190 000	9.3	8.	8.7	17.	7.	.3		9		3 387 3	8	13.	0.	R	r Ru 91
8 u	1 10	190 000	9.3	8.	8.7	17.	7.	.3		9		3 0989	8	13.	0.	R	e
9 u	9 17	190 000	9.3	9	9.	17.	7.	.3		9		3 69	81	13.	0.	R	e/ Ru 91
9 u	9 3	190 000	9.	9	9.	17.	7.	.3		9		3 69889	81	13.	0.	R	r Ru 9
9 u	10	190 000	9.	9	9.	17.	7.	.		9		3 71100	81	13	0.	R	e
9 u	1 0	190 000	9.	9	9.	17.	7.	.		9		3 77963	81	13	0.	R	e
10 u	8 6	190 000	9.	9.	9.7	17.	7.	.		9		360 10	83	13	0.	R	e
10 u	10 08	190 000	9.	9.	9.7	17.	7.	.		9		360 917	8	13	0.	R	e/ Ru 9
10 u	10 8	190 000	10	9.	9.7	17.	7.	.		9		36069 6	8	13	0.	R	r Ru 93
10 u	11 30	190 000	10	9.	9.7	17.	7.	.		9		3607939	8	13	0.	R	e
10 u	13	190 000	10	9.	9.7	17.	7.	.3		9		3611 9	8	13	0.	R	e
11 u	8 11		10									36				R	er ff/ C re r

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments	
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)						
11 u	10 6		10										36 677			R	r u / C ge fi er B er	
11 u	1	190 000	10	8.7	9.	17.	7.	.		9			36 867	81	1 .	0.	R	e
11 u	1 6	190 000	10	8.7	9.	17.	7.	.		9			36316	81	1 .	0.	R	e / Fi i 93
11 u	1 6	190 000	10	8.7	9.	17.	7.	.		9			3631889	81	1 .	0.	R	r 9 / e
1 u	10 10	190 000	10										363668				R	er ff / Re r
1 u	10 8	190 000	10	8.	9	17.	7.	.		9			3637 11	79	1 .	0.	R	
1 u	8 0	190 000	10										367169				R	er ff / Re r
1 u	10 1	190 000	10	8.7	9.	17.	7.	.		9			367 98	80	1 .	0.	R	e / 9
1 u	10	190 000	8.1	8.	9	17.	7.	.3		9			367 6 6	80	1 .	0.	R	r 9
1 u	1	190 000	8.1	8.7	9.	17.	7.	.		9			367868	80	1 .	0.	R	e
1 u	1 1	190 000	8.1	8.7	9.	17.	7.	.		9			368 73	80	1 .	0.	R	e
1 u	9 0	190 000	8.1	9.7	10	17.	7.	.		9			3709380	79	1 .	0.	R	e
1 u	11 3	190 000	8.1	9.7	10	17.	7.	.		9			37130	80	1 .	0.	R	e / Ru 9
1 u	11 6	190 000		9.7	10	17.	7.	.		9			3713 6	80	1 .		R	r Ru 96
1 u		190 000		9.7	10.	17.	7.	.		9			371 7	80	1 .		R	e
16 u	13 0	190 000											371819				R	er Off/Re r (Tr 96)
16 u	1 0	190 000	9	8.7	9.	17.	7.	.		9			371878	81	1 .	0.	R	r Ru 97
16 u	1 00	190 000	9	8.7	9.	17.	7.	.		9			37 03 8	81	1 .	0.	R	e
16 u	17 3	190 000	9	8.7	9.	17.	7.	.		9			37 099	81	1 .	0.	R	e
17 u	9 3	190 000	9										37 8				R	er Off/Re r
17 u	10 3	190 000	9	9.	9.	17.	7.	.		9			37 9	80	1 .	0.	R	e
17 u	13	190 000	9	9.	9.	17.	7.	.		9			37 0963	81	1 .	0.	R	e / Ru 97
17 u	1 0	190 000	10.1	9.	9.	17.	7.	.		9			37 1 76	81	1 .	0.	R	r Ru 98
17 u	1 30	190 000	10.1	9.	9.7	17.	7.	.		9			37 1	81	1 .	0.	R	e
18 u	8 1	190 000	10.1										37 66 6				R	er Off/Re r
18 u	9 07	190 000	10.1	9	9.	17.	7.	.		9			37 7969	79	1 .	0.	R	e
18 u	10 33	190 000	10.1	9	9.	17.	7.	.6		9			3760076	79	1 .	0.	R	e

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
18 u	13 09	190 000	10.1	9	9.	17.	7.	.6		9		3763989	80	1 .	0.	R	e/ Ru 98
1 u	11	190 000	8.	13.	1	17.	7.	.7		8.7		3806 9	79	1 .	0.	R	r Ru 100
1 u	1	190 000	8.	1	1 .	17.	7.	.7		8.7		3867969	79	1 .	0.	R	e
1 u	1 3	190 000	8.	1	1 .	17.	7.	.7		8.7		3871 7	80	1 .	0.	R	e
u	9	190 000	8.	1	1 .	17.	7.	.7		8.		3897 3	79	1 .	0.	R	e
u	1 1	190 000	8.	1	1 .	17.	7.	.7		8.		390119	80	1 .	0.	R	e/ Ru 100
u	1 0	190 000	10.	1	1 .	17.	7.	.7		8.		390 110	80	1 .	0.	R	r Ru 101
u	13 10	190 000	10.	1	1 .	17.	7.	.7		8.		390 63	80	1 .	0.	R	e
u	18 03	190 000	10.	1	1 .	17.	7.	.7		8.		3909 3	81	1 .	0.	R	e
3 u	8 6	190 000	10.	1 .	1.7	17.	7.	.6		8.		39301 3	79	1 .	0.	R	e
3 u	1 03	190 000	10.	1 .	1.7	17.	7.	.6		8.		393 3 9	80	1 .	0.	R	e/ Ru 101
3 u	1 30	190 000	11.7	16.	16.	1	7	.		9		393 786	80	1 .	0.	R	r Ru 10 /C ge Ti e
3 u	1 8	190 000	11.7	16.	16.	1	7	.		9		3936388	80	1 .	0.	R	e
3 u	1 00	190 000	11.7	1 .	1	1	7	.		8		3939166	8	1 .	0.	R	e
u	8 0	190 000	11.7	1 .	1.7	1	7	.		8		39639 3	80	1 .	0.	R	e
u	10 9	190 000	11.7	1 .	16	1	7	.		8		396701	81	1 .	0.	R	e/ Ru 10
u	1 1	190 000		8.7	9	1	7	.		9		396737	8	16		R	Ci ri B e C e /Re r
u	16 36	190 000	10.8	9	9.	1	7	.		9		3968	83	16		R	r Ru 103
u	17 0	190 000	10.8	9	9.	1	7	.		9		3969 10	83	16		R	e
u	8 3	190 000	10.8	9.	10	1	7	.		9		399 0	81	16	0.	R	e/B ee u O Li e
u	10 8	190 000	10.8	9.	10	1	7	.		9		399 61	8	16	0.	R	e
u	1 0	190 000	10.8	9.	10	1	7	.		9		000061	83	16	0.	R	e/ Ru 103
u	1	190 000	9.	9.	10	1	7	.		9		000 33	83	16	0.	R	r Ru 10
u	1 06	190 000	9.	9.	10	1	7	.		9		001 81	83	16	0.	R	e
u	17 0	190 000	9.	9.	10	1	7	.		9		00 308	8	16	0.	R	e
6 u	10 0	190 000	9.	9.	10	1	7	.		9		0 9971	8	16	0.	R	e
6 u	0 30		9.									0373		16	0.	R	er Off/Re r

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
8 u	9 3	190 000	9.	9.	10	1	7	.		9		0899 0	8	16	0.	R	e/ Ru 10
9 u	9 3	8 000	7.7	9.	10	1	7	.		9		1170 8	8	16	0.	R	r Ru 10 / r Au .8
9 u	11 01	8 000	7.7	9.	10	1	7	.		9		118771	8	16	0.	R	e
9 u	18 00	8 000	7.7	9.	10	1	7	.		9		1 8901	8	16	0.	R	e
30 u	8 09	8 000	7.7									1 81	8	16	0.	R	er Off/Re r
30 u	9 0	8 000	7.7	9.7	10.	1	7	.		9		1 9 38	83	16	0.	R	e
30 u	11 00	8 000	7.7	9.7	10.	1	7	.		9		1 308	8	16	0.	R	e/ Ru 10
30 u	11	8 000	9.7	9.7	10.	1	7	.		9		1 36	8	16	0.	R	r Ru 106
30 u	1 3	8 000	9.7	10	10.	1	7	.		9		1 009	8	16	0.	R	e
30 u	1 6	8 000	9.7	9.7	10.	1	7	.		9		1 9 0	8	16	0.	R	e
31 u	8	8 000	9.7	11.	1	1	7	.		9		1833 9	83	16	0.	R	e
31 u	1 01	8 000	9.7	1	1.	1	7	.		9		18771	8	16	0.	R	e/ Ru 106
31 u	1 6	8 000	10.	1	1.	1	7	.		9		18901	8	16	0.	R	r Ru 107
31 u	13 38	8 000	10.	1	1.	1	7	.		9		1900 1	8	16	0.	R	e
31 u	1 36	8 000	10.	1	1.7	1	7	.6		9		19 963	8	16	0.	R	e
1 Aug	10 1	8 000	10.	11.								198 78				R	er Off/Re r
1 Aug	10 3	8 000	10.	11.	1	1	7	.6		9		19960	8	16	0.	R	e
1 Aug	13 18	8 000	10.	11.	1.	1	7	.6		9		031	8	16	0.	R	e/ Ru 107
1 Aug	13	8 000		11.	1.	1	7	.6		9		03717	8	16	0.	R	r Ru 108
1 Aug	1 06	8 000		1	1.	1	7	.6		9		0 319	8	16	0.	R	e
Aug	10 30	8 000										10180				R	Re r
3 Aug	1	8 000		1.	1.7	1		3		8.		10 8	80	16	0.	R	e
Aug	10 0	8 000										8 93				R	er Off/Re r
Aug	10 7	8 000		1	1	1		3		8.		9 09	80	16	0.	R	e
Aug	13 0	8 000		16	16.	1		3		8.		6 9	80	16	0.	R	e/ Ru 108
Aug	16 6	8 000		16.	16.7	1		3		8.		66 1	8	16	0.	R	r Ru 109
Aug	16 0	8 000		16.	16.	1		3		8.		66906	8	16	0.	R	e

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
Aug	8	8 000		16	16.	1		3		8.		69 1	81	16	0.	R	er Off/Re r
Aug	8	8 000		16.	16.	1		3		8.		70039	80	16	0.	R	e
Aug	10 1	8 000		16.	16.7	1		3		8.		71866	80	16	0.	R	e
Aug	1 0	8 000		8.	16.7	1		3		8.		73 3	80	16	0.	R	e/ Ru 109
Aug	18 3	8 000		7	8.	1				10		736 8	80	16	0.	R	Afer Ci ri A i /B e C e
Aug	18 0	8 000		7.	7.	1				9		73797	80	16	0.	R	r Ru 110
6 Aug	9 6	8 000		7.7	7.7	1				9		9 1	80	16	0.	R	e
6 Aug	13 0	8 000		7.	7.7	1				9		3001 6	81	16	0.	R	e/ Ru 110
6 Aug	13	8 000		7.	7.7	1				9		3010	81	16	0.	R	r Ru 111
6 Aug	1 3	8 000		7.	7.7	1				9		30 3	81	16	0.	R	e
6 Aug	16 30	8 000		7.	7.7	1				9		30 09	81	16	0.	R	e
7 Aug	8 3	8 000		7.7	8	1				9		3 839	81	16	0.	R	e
7 Aug	1 3	8 000		7.7	8	1				9		33 03	81	16	0.	R	e/ Ru 111
7 Aug	13 08	8 000		7.7	8	1				9		33 1 0	81	16	0.	R	r Ru 11
7 Aug	13 36	8 000		7.7	8	1				9		33 836	81	16	0.	R	e
7 Aug	16	8 000										338 66				R	er Off/Au er Off
8 Aug	8 3	8 000														R	Re r /Au O
8 Aug	9 0	8 000		7.	7.	1				9		339300	83	16	0.	R	e
8 Aug	11 3	8 000		7.	7.7	1				9		3 31 1	81	16	0.	R	e
8 Aug	13 1	8 000		7.7	8	1				9		3 690	81	16	0.	R	e/ Ru 11
8 Aug	13	8 000		7.7	8	1				9		3 6 19	81	16	0.	R	r Ru 113
8 Aug	1 3	8 000		7.7	8	1				9		3 7 79	80	16	0.	R	e
9 Aug	1 0	8 000		8.	8.7	1				9		383898	80	16	0.	R	e
10 Aug	10 0	8 000		9.	10	1				9		1 331	79	16	0.	R	e
11 Aug	8 8	8 000										1 1				R	er Off/Re r
11 Aug	10 0	8 000		9.7	10	1				9		7 7	80	16	0.	R	e/ Ru 113
11 Aug	10	8 000		9.7	10.	1				9		81	81	16	0.	R	r Ru 11

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
11 Aug	11 1	8 000		10	10.	1				9		8896	81	16	0.	R	e
11 Aug	1 1	8 000		10.	10.7	1				9		7	80	16	0.	R	e
1 Aug	1 3	8 000		11.7	1	1				9		808 0	80	16	0.	R	e
1 Aug	11 01	8 000		11.7	1	1				9		8 6 3	80	16	0.	R	e/ Ru 11
1 Aug	11	8 000		1	1 .	1				9		8 707	80	16	0.	R	r Ru 11
1 Aug	1 08	8 000		1	1 .	1				9		86 88	80	16	0.	R	e
1 Aug	1 00	8 000		1	1 .	1				9		990	80	16	0.	R	e
13 Aug	11 0	8 000		13	13.	1				9		0 0	81	16	0.	R	e
13 Aug	1	8 000		13	13.	1				9		8	81	16	0.	R	e/ Ru 11
13 Aug	13 1	8 000		1	1 .	1				9		3 3	81	16	0.	R	r Ru 116
13 Aug	1 0			1	1 .	1				9		6	81	16	0.	R	e
13 Aug	16 31			1	1 .	1				9		8	8	16	0.	R	e
1 Aug	8 6			1 .	16	1				9		103	81	16	0.	R	e
1 Aug	1 31			1 .7	16	1				9		8097	8	16	0.	R	e/ Ru 116
1 Aug	13 00			16	16.	1		.3		8.		8770	8	16	0.	R	r Ru 117
1 Aug	13			16	16.	1				8.		60118	83	16	0.	R	e
1 Aug	1 3			16	16.	1				8.		6 91	8	16	0.	R	e
1 Aug	11 0											6618				R	er Off/Re r
1 Aug	11 3			1 .	1.7	1				9		66	8	16	0.	R	e
1 Aug	11 1			1	1 .	1		.1		8.		699 8	8	16	0.	R	e/ Ru 117
1 Aug	1 1			1 .	1.7	1				8.		7 6 8	83	16	0.	R	r Ru 118
1 Aug	16 0			1 .	1.7	1				8.		73791	83	16	0.	R	e
1 Aug												77 8				R	er Off/Re r
16 Aug	1 0			13.7	1	1				9		7761	8	16	0.	R	e
17 Aug	1 09											97031				R	er Off/Re r
17 Aug	1 19			1 .7	1	1				8.7		97 1	8	16	0.	R	e
18 Aug	8 0											603 7				R	er Off/Re r

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed								Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments	
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)						Totalizer Reading (liters)
18 Aug	8 3			1.7	1	1				6.7		603 73	81	16	0.	R	e/ Ru 118
18 Aug	13 00											606706				R	Cirri A i Ce /Be
19 Aug	13 07					1		1.		9		6089	80	16	0.	R	r Ru 119/ e
19 Aug	18 30											617733				R	er Off/Re r
19 Aug	18 0					1		1.		9		618 66	8	16	0.	R	e
0 Aug	9 0					1		1.6		9		6 00	81	16	0.	R	e
0 Aug	1 0					1		1.6		9		6 9611	83	16	0.	R	e/ Ru 119
0 Aug	1 0					1		1.6		9		6 11	8	16	0.	R	r Ru 1 0
0 Aug	16				.7	1		1.6		9		6 3 8	8	16	0.	R	e
1 Aug	10 1											6 77 3				R	er Off/Re r
1 Aug	11 0				.3	1		1.6		9		6 9 98	8	16	0.	R	e
1 Aug	13 36					1		1.6		9		663180	8	16	0.	R	e/ Ru 1 0
1 Aug	1					1		1.6		9		66 09	8	16	0.	R	r Ru 1 1
1 Aug	1 09					1		1.6		9		66 698	8	16	0.	R	e
1 Aug	17 08					1		1.6		9		6689 3	8	16	0.	R	e
Aug	8 17				.7	1		1.7		9		693 61	81	16	0.	R	e
Aug	11				.7	1		1.6		9		698763	83	16	0.	R	e/ Ru 1 1
Aug	1 11				.7	1		1.6		9		699 36	83	16	0.	R	r Ru 1
Aug	1 0				.7	1		1.6		9		700188	83	16	0.	R	e
Aug	9 1					1		1.7		9		771661	8	16	0.	R	e
Aug	8											783 19				R	er Off/Re r
Aug	8 0				.7	1		1.6		9		783991	8	16	0.	R	e
Aug	10 18				.7	1		1.6		9		786 9	8	16	0.	R	e/ Ru 1
Aug	11 07				.7	1		1.6		9		787807	8	16	0.	R	r Ru 1 3/ e
Aug	1 0					1		1.6		9		79 6 6	8	16	0.	R	e/Tur Off Bee u
6 Aug	7				.7	1		1.8		9		8 0916	81	16	0.	R	e/Bee u O Li e
6 Aug	11 00				.7	1		1.8		9		8 6701	81	16	0.	R	e/ Ru 1 3

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure P1/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)					
6 Aug	11			.	.	1		1.8		9		8 796	81	16	0.	R	r Ru 1 / e
7 Aug	1 07			.7	6	1		1.9		9		831707	81	16	0.	R	e
7 Aug	8 0			.7	6	1		1.9		9		861839	80	16	0.	R	e
7 Aug	1 0			.7	6	1		1.9		9		866908	81	16	0.	R	e/ Ru 1
7 Aug	1 3			.7	6	1		1.9		9		867686	81	16	0.	R	r Ru 1 / e
7 Aug	1 03			.7	6	1		1.9		9		87169	8	16	0.	R	e
8 Aug	8 1			6.	6.7	1		1.9		9		899030	80	16	0.	R	e
8 Aug	11 10			6.	6.	1		1.9		9		903693	80	16	0.	R	e/ Ru 1
8 Aug	11 30			6.	6.	1		1.9		9		90 37	80	16	0.	R	r Ru 1 6/ e
8 Aug	13 30			6.	6.	1		1.9		9		907617	81	16	0.	R	e
8 Aug	16 00			6.	6.8	1		1.9		9		911381	8	16		R	e/Re e Bee u
9 Aug	7 9			6.	6.7	1				9		9363	80	16		R	e/ Ru 1 6
9 Aug	9 0			6.	6.7	1				9		938718	80	16	0.	R	r Ru 1 7
e	9			6.	6.	1		1.9		9		03 01	8	16		R	er Off/Re r
3 e	1 0			.7	6	1		1.6		9		037 88	8	16	0.	R	r Ru 1 8/ e
e	16 0			6.	6.7	1		1.8		9		083 7	83	16	0.	R	e/ Ru 1 8
e	17 1			6.	6.7	1		1.8		9		08	83	16	0.	R	r Ru 1 9/ e
e	9			7	7.	1		1.8		9		113 17	81	16	0.	R	e/ Ru 1 9
e	10 3			7	7.	1		1.8		9		11 36	81	16	0.	R	r Ru 130/ e
7 e	11 0			9	9.	1				9		197 69	80	16	0.	R	e
8 e	13 1			9.	9.7	1		1.		9		16	80	16	0.	R	e/ Ru 130
8 e	13 33			9.	10	1		1.		9		3113	80	16	0.	R	r Ru 131/ e
9 e	18 10			1 .	1 .	1		0.8		8.		8777	8	16	0.	R	e/ Ru 131
9 e	18 30			.	1.7	1		0.8		9		88307	8	16	0.	R	r Ru 13 / e
10 e	11 19											9 11					er Off/Re r
10 e	11 6			11.	1	1		8		9		9 0	8	16	0.		e/ Ru 13
10 e	11 0											9 306					Tur Off er

TABLE 3 ZENON DAILY OPERATIONAL LOG

Date	Time	Coagulant Conc. (mg/L)	Coagulant Dosage (mg/L)	Zeeweed									Temp. Zweed TI 01 (°F)	Air Zweed FI 02	Bleed Rate P6 (gpm)	Operator Initials	Comments	
				Vacuum after Backflush (in Hg)	Vacuum before Backflush (in Hg)	Bpulse Duration (sec)	Bpulse Frequency (minutes)	Bpulse Pressure PI/VI 01 During BW (psi)	Bpulse Loss (liters)	Permeate Rate FI 01 1 (gpm)	Permeate Rate to Drain 1 (gpm)	Totalizer Reading (liters)						
10 e	1 0												9 367					Tur On/Tur Off

**TABLE 4. ZENON MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning		Influent			Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput GPD	Total Phosphorus Conc. (mg/L)	TSS Conc. (mg/L)	Flux GPD/ft <sup>2</sup>	Vacuum After Backwash (in Hg)	Total Phosphorus Conc. (mg/L)
37	3/ 1/97	.67	FeC <sub>3</sub>	.	1 91			9.8	11.	
38	3/ /97	.31	FeC <sub>3</sub>	.	138	0.0		3 .0	11.	0.007
39	3/ /97	7.0	FeC <sub>3</sub>	.	6	0.0 1		3 .0	11	0.00 8
40	3/ 6/97	1.1	FeC <sub>3</sub>	.	6 8			31.9	11.	
41	3/ 7/97	.19	FeC <sub>3</sub>	.	3116			3 .0	13	
42	/1/97	.67	FeC <sub>3</sub>	.	3397	0.018		3 .0	1 .	0.01
42a	/ /97	.33	FeC <sub>3</sub>	1.	3197			3 .0	1 .	
43	/ /97	1 . 8	FeC <sub>3</sub>	1.	737			3 .0	1	
44	/8/97	10.73	FeC <sub>3</sub>	1.	6 3			3 .0	1 .	
45	/10/97	9.83	FeC <sub>3</sub>	1.	900	0.0		3 .0	13	0.0079
46	/11/97	7.98	FeC <sub>3</sub>	0.	787	0.011		3 .0	1	0.0091
46a	/1 /97	17.68	FeC <sub>3</sub>	0.	10608			3 .0	1	
47	/1 /97	6.69	FeC <sub>3</sub>	0.	07	0.039	30	3 .	1	0.0 6
47a	/16/97	6.19	N e		371			3 .0	1 .	
48	/17/97	8.97	FeC <sub>3</sub>	0.	381	0.0	.7	3 .0	16	0.0069
48a	/ 1/97	0.7	A u	0.	86			3 .6	16	
49	/ /97	10. 8	N e		069	0.0 9		.8	13	0.01
52	/ /97	.	A u		1 63			3 .0	13	
52b	/ 8/97	3.7	A u		137			30.	11.	

**TABLE 4. ZENON MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning		Influent			Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput GPD	Total Phosphorus Conc. (mg/L)	TSS Conc. (mg/L)	Flux GPD/ft <sup>2</sup>	Vacuum After Backwash (in Hg)	Total Phosphorus Conc. (mg/L)
53	/ 9/97		A u	0.7	797	0.0		17.7	1	0.008
54	/1/97	6.66	A u	0.7	001			3 .0	7.	
55	/ /97	3	A u	0.7	8307	0.018		19.3	9.	0.01
56	/ /97	3	N e		1379			3 .0	10.	
56a	/7/97	0.11	A u	0.9	1 067			3 .0	10	
56b	/8/97	.83	A u	0.9	13699			3 .0	11.	
57	/9/97	.7	A u	0.9	980	0.0 3		0.3	11.	0.009
58	/1 /97	8.78	A u	3.	9 6			3 .0	1 .	
59	/13/97	. 7	A u	.6	10 0	0.0		.3	13.	0.008
60	/1 /97	1 .0	A u	.	97 7			3 .6	1	
61	/1 /97	0.6	A u	.	8 6	0.016		1.9	1 .	0.008
63	/ 0/97	3.9	A u	.6	9018	0.0 8		0.1	9.	0.0089
64	/ 1/97	.16	A u	.	9 7	0.019		0.0	9.	0.018
65	/ /97	. 7	A u	1.7	838	0.018	7	0.1	9	0.016
66	/ 3/97	1 .	N e		7987			7.7	9.	
68	/ 8/97	. 1	N e		6 99	0.0		1 .1	9	0.0099
76	6/9/97	31.86	N e		1 1	0.0 3		36.1	1	0.017
77	6/10/97	.76	FeC <sub>3</sub>	3.3	009	0.0	.	6.	1	0.00 7
78	6/11/97	17.89	FeC <sub>3</sub>	1.	9 7	0.017		8.	1 .	0.006

**TABLE 4. ZENON MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning		Influent			Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput GPD	Total Phosphorus Conc. (mg/L)	TSS Conc. (mg/L)	Flux GPD/ft <sup>2</sup>	Vacuum After Backwash (in Hg)	Total Phosphorus Conc. (mg/L)
79	6/13/97	.	FeC <sub>3</sub>	0.8	9 93	0.019	6	0.9	1	0.0077
80	6/13/97	.1	FeC <sub>3</sub>	1.	8 9	0.017		18.7	1	0.01
82	6/17/97	3. 3	FeC <sub>3</sub>		9	0.0		1.0	13.	0.008
83	6/18/97	1.37	FeC <sub>3</sub>		8 0	0.016		1.3	1	0.006
84	6/19/97	3.6	FeC <sub>3</sub>		9	0.01	6.	1.	1 .7	0.01
85	6/30/97	.6	FeC <sub>3</sub>	.1	8 8	0.0		8.6	7.	0.00
86	7/1/97	.0	FeC <sub>3</sub>	7.	99	0.03		.0	8	0.00
87	7/ /97	.0	FeC <sub>3</sub>	7	907	0.01		.0	8	0.00
88	7/3/97	3. 6	FeC <sub>3</sub>	7.	9 70	0.0	7	1.	8.	0.00
89	7/7/97	8.0	FeC <sub>3</sub>	7.8	13 0	0.0		1 .9	8.	0.00
90	7/8/97	0.9	FeC <sub>3</sub>	11.6	8973	0.098	9.	.9	8.	0.01
91	7/9/97	0.0	FeC <sub>3</sub>	9.3	8109	0.071		1.6	8.	0.01
92	7/10/97	3.9	FeC <sub>3</sub>	9.	9 19	0.081		1.	9	0.0079
93	7/11/97	17. 6	FeC <sub>3</sub>	10	6	0.0 8		0.	9.	0.01
94	7/1 /97	. 3	FeC <sub>3</sub>	10	11386	0.019		.8	8.	0.00 3
95	7/1 /97	. 3	FeC <sub>3</sub>	9.1	9881	0.0		1.7	8.7	0.00 9
96	7/16/97	1.	FeC <sub>3</sub>	9.1	1 6			3.0	9.7	
97	7/17/97	0. 7	FeC <sub>3</sub>	9	8 01	0.0		.0	9.	0.00
98	7/18/97	6. 7	FeC <sub>3</sub>	10.1	3306	0.0		7.3	9	0.00

**TABLE 4. ZENON MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning		Influent			Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput GPD	Total Phosphorus Conc. (mg/L)	TSS Conc. (mg/L)	Flux GPD/ft <sup>2</sup>	Vacuum After Backwash (in Hg)	Total Phosphorus Conc. (mg/L)
100	7/ /97	3.7	FeC <sub>3</sub>	8.	0 9	0.0 7	9	6.	1	0.0077
101	7/ 3/97	. 6	FeC <sub>3</sub>	10.	8776	0.0		0.7	1	0.0061
102	7/ /97	3.79	FeC <sub>3</sub>	11.7	8 1	0.017	11	18.	1 .	0.00
103	7/ /97	0.77	FeC <sub>3</sub>	10.8	8333	0.0 6	7	1.	9.	0.008
104	7/ 8/97	61.1	FeC <sub>3</sub>	9.	36	0.073		0.6	9.	0.00
105	7/30/97	1 .3	A u	.6	9316	0.091		3 .6	9.	0.016
106	7/31/97	3.3	A u	.8	9007	0.077	6	0.6	10	0.01
107	8/1/97	8.61	A u	6.1	3736	0.079		3.1	1	0.016
108	8/ /97	7.98	A u	.8	1 0	0.09		9.6	1 .	0.017
109	8/ /97	.8	A u	3.	18 1	0.1		0.	1 .	0.013
110	8/6/97	18.	A u	.9	69	0.031		0.	1 .	0.009
111	8/7/97	.97	A u	6.	88	0.0 3		0.	1 .	0.01
112	8/8/97	6.76	A u	6.1	79	0.08		.0	1 .	0.018
113	8/11/97	68.6	A u	.3	6763	0.0 7		0.8	1 .	0.00
114	8/1 /97	.1	A u	6.1	96	0.0		1.3	1 .	0.0086
115	8/13/97		A u	6.3	97 7	0.068		0.8	1 .	0.00
116	8/1 /97	3. 8	A u	7.	9 0	0.0	8	1.1	1 .	0.0086
117	8/1 /97	7.6	A u	.9	9 3	0.061	6	0.7	1 .	0.011
118	8/18/97	6.03	A u	6.7	8167	0.0 1		16.7	1 .	0.0086

**TABLE 4. ZENON MICROFILTRATION DATA SUMMARY**

Test Run	Date	Duration hrs/day	Chemical Conditioning		Influent			Membrane Measurements		Effluent
			Coagulant Type	Dosage (mg/L)	Throughput GPD	Total Phosphorus Conc. (mg/L)	TSS Conc. (mg/L)	Flux GPD/ft <sup>2</sup>	Vacuum After Backwash (in Hg)	Total Phosphorus Conc. (mg/L)
119	8/ 0/97	. 7	AC	.8	107 0	0.07		3.3	1 .	0.009
120	8/ 1/97	7.	AC	.1	3177	0.0 8	6	3.	1 .	0.013
121	8/ /97	1	AC	7.1	889	0.083		.6	1 .	0.01
122	8/ /97	8.31	AC	.9	989	0.1		.	1 .	0.013
123	8/ 6/97	3.88	AC	6.3	10 7	0.		.9	1 .	0.0 7
124	8/ 7/97	.33	AC	.8	10 88	0.088		.6	1 .	0.013
125	8/ 8/97	.63	AC	.8	9 1	0.0 1	7	.	1 .	0.0 1
126	8/ 8/97	0.3	AC	.9	8 8	0.06	6	.	1 .	0.00
127	9/ /97	.9	AC	6.1	6039	0.0 3		.8	1 .	0.00
128	9/ /97	6.6	N e		1 1	0.067		.	1 .	0.00
129	9/ /97	16.7	N e		7 99	0.0 9	7	.3	1 .	0.0 8
130	9/8/97	7 .68	N e		33 73	0.09		.0	1 .	0.00
131	9/9/97	8.6	N e		11798	0.3		.0	1 .	0.031
132	9/10/97		N e		18	0.077		.3	1 .	0.0

\* MF Unit Recirculating

Used TDP Value for this day

O e f f e e e e i i i u e u e i e e e e e i i i .  
 If T e e T u e f e r e i u r u u e u e i .

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Date: 10/30/96

Run #: 2

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	10		1				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU	65		65				
Alkalinity	mg/L							
Conductivity	µS/cm	681		673				
Total Dissolved Solids (TDS)	mg/L	420		414				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.103		0.08				
Total Dissolved Phosphorus	mg/L	0.011		0.057				
Soluble Reactive Phosphorus	mg/L	0.134		0.127				
TKN	mg/L	1.74		1.2				
Ammonia	mg/L	0.62		0.27				
Nitrate-Nitrite	mg/L	0.31		0.28				
<b>ANIONS</b>								
Sulfate	mg/L	27.5		45.5				
Chloride	mg/L	101		104				
<b>CATIONS</b>								
Reactive Silica	mg/L	12.4		14.6				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers.
- Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Date: 10/31/96

Run #: 3

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	1		<1				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU	90		90				
Alkalinity	mg/L							
Conductivity	µS/cm	1168		1168				
Total Dissolved Solids (TDS)	mg/L	722		727				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.045		0.035				
Total Dissolved Phosphorus	mg/L	0.045		0.034				
Soluble Reactive Phosphorus	mg/L	0.198		0.216				
TKN	mg/L	2.39		2.35				
Ammonia	mg/L	0.15		0.16				
Nitrate-Nitrite	mg/L	<0.06		0.45				
<b>ANIONS</b>								
Sulfate	mg/L	36.4		45.5				
Chloride	mg/L	183		169				
<b>CATIONS</b>								
Reactive Silica	mg/L	22.7		23.1				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers
3. Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/1/96

Run #: 4

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	1		<1				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU	90		87				
Alkalinity	mg/L	321		324				
Conductivity	µS/cm	1151		1149				
Total Dissolved Solids (TDS)	mg/L	717		731				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.011		0.007				
Total Dissolved Phosphorus	mg/L	0.012		0.007				
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L	2.88		2.6				
Ammonia	mg/L	1.32		1.37				
Nitrate-Nitrite	mg/L	<0.05		<0.05				
<b>ANIONS</b>								
Sulfate	mg/L	37.5		41.4				
Chloride	mg/L	171		178				
<b>CATIONS</b>								
Reactive Silica	mg/L	23.1		22.9				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/4/96

Run #: 5

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	10		<1				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU	55		50				
Alkalinity	mg/L	145		139				
Conductivity	µS/cm	586		575				
Total Dissolved Solids (TDS)	mg/L	373		370				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.047		0.027				
Total Dissolved Phosphorus	mg/L	0.028		0.025				
Soluble Reactive Phosphorus	mg/L	0.02		0.02				
TKN	mg/L	0.79		0.76				
Ammonia	mg/L	0.16		0.18				
Nitrate-Nitrite	mg/L	0.32		0.34				
<b>ANIONS</b>								
Sulfate	mg/L	26.7		29.1				
Chloride	mg/L	70.9		69				
<b>CATIONS</b>								
Reactive Silica	mg/L	27.3		12.8				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/5/96

Run #: 6

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	13.8		<1				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU	60		55				
Alkalinity	mg/L	151		151				
Conductivity	µS/cm	640		639				
Total Dissolved Solids (TDS)	mg/L	411		381				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.046		0.027	0.093	0.121		
Total Dissolved Phosphorus	mg/L	0.029		0.024				
Soluble Reactive Phosphorus	mg/L	0.02		0.02				
TKN	mg/L	1.07		0.65				
Ammonia	mg/L	0.28		0.28				
Nitrate-Nitrite	mg/L	0.28		0.44				
<b>ANIONS</b>								
Sulfate	mg/L	40.9		35.5				
Chloride	mg/L	80.5		83.3				
<b>CATIONS</b>								
Reactive Silica	mg/L	9.67		11.6				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/6/96

Run #: 7

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	3		<1				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU	90		87				
Alkalinity	mg/L	299		306				
Conductivity	µS/cm	1088		1140				
Total Dissolved Solids (TDS)	mg/L	695		677				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.013		0.006				
Total Dissolved Phosphorus	mg/L	0.009		<0.006				
Soluble Reactive Phosphorus	mg/L	0.02		0.02				
TKN	mg/L	2.25		2.18				
Ammonia	mg/L	1.25		1.13				
Nitrate-Nitrite	mg/L	0.06		0.05				
<b>ANIONS</b>								
Sulfate	mg/L	36.5		41.4				
Chloride	mg/L	147		158				
<b>CATIONS</b>								
Reactive Silica	mg/L	21.3		22.9				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/7/96                      Run #: 8                      Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	2		<1				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU	90		87				
Alkalinity	mg/L	324		334				
Conductivity	µS/cm	1218		1220				
Total Dissolved Solids (TDS)	mg/L	789		782				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.01		0.006				
Total Dissolved Phosphorus	mg/L	0.014		0.006				
Soluble Reactive Phosphorus	mg/L	0.02		0.02				
TKN	mg/L	2.74		2.46				
Ammonia	mg/L	1.47		1.51				
Nitrate-Nitrite	mg/L	0.07		0.05				
<b>ANIONS</b>								
Sulfate	mg/L	37		41.4				
Chloride	mg/L	175		168				
<b>CATIONS</b>								
Reactive Silica	mg/L	22.8		24.4				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/8/96

Run #: 9

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	1		<1				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU	90		87				
Alkalinity	mg/L	356		356				
Conductivity	µS/cm	1246		1247				
Total Dissolved Solids (TDS)	mg/L	795		799				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.023		0.02				
Total Dissolved Phosphorus	mg/L	0.017		0.01				
Soluble Reactive Phosphorus	mg/L	0.011		0.006				
TKN	mg/L	1.87		1.71				
Ammonia	mg/L	1.6		1.56				
Nitrate-Nitrite	mg/L	0.25		<0.06				
<b>ANIONS</b>								
Sulfate	mg/L	48.1		48.2				
Chloride	mg/L	187		184				
<b>CATIONS</b>								
Reactive Silica	mg/L	22.8		23.1				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/11/96

Run #: 10

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	7		<1		373		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.075		0.067		1.98		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/12/96

Run #: 11

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	16			23	942		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.06		0.022	0.148	3.15		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/13/96

Run #: 12

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	22			114	192		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.06		0.025	1.72	1.81		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/14/96

Run #: 13

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	1			181	1294		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.02		0.016	0.809	1.63		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/15/96

Run #: 14

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	1			13	2070		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.025		0.017	0.111	6.01		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/18/96

Run #: 15E

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	6			13	1518		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.046		0.02	0.207	0.77		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/18/96

Run #: 15S

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	6			13	1518		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu							
Alkalinity	mg/L							
Conductivity	umhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.046		<.010	0.22	0.34		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/19/96

Run #: 16E

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	22			84	1645		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.083		0.036	0.36	8.05		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/19/96

Run #: 16S

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	22			84	1645		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu							
Alkalinity	mg/L							
Conductivity	umhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.11		0.052	0.3	0.4		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	ug/L							
Atrazine	ug/L							
2,4-D	ug/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/20/96

Run #: 17

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	29			228	2190		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.086		0.038	3.41	7.84		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	rg/L							
Atrazine	rg/L							
2,4-D	rg/L							

Notes:

1. < = Below laboratory method detection limit

2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/21/96

Run #: 18

Everglades Laboratories, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	2			341	2738		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.027		0.011	0.635	4.71		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	rg/L							
Atrazine	rg/L							
2,4-D	rg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS								
Sample Collected: 11/22/96		Run #: 19E			Everglades Laboratories, Inc.			
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	1			76	1983		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	PCU							
Alkalinity	mg/L							
Conductivity	µS/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.022		0.01	0.309	6.36		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	rg/L							
Atrazine	rg/L							
2,4-D	rg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 11/22/96

Run #: 19S

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	1			76	1983		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu							
Alkalinity	mg/L							
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.079		0.056	0.36	0.43		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	rg/L							
Atrazine	rg/L							
2,4-D	rg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/2/97

Run #: 20

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	<5.0		<5.0				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cμ							
Alkalinity	mg/L							
Conductivity	μmhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.014		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	rg/L							
Atrazine	rg/L							
2,4-D	rg/L							

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/8/97

Run #: 21

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	< 5.0		< 5.0				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu							
Alkalinity	mg/L							
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.013		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/9/97

Run #: 22

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	< 5.0		< 5.0				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu							
Alkalinity	mg/L							
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.014		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/10/97

Run #: 23

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	< 5.0		< 5.0				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu							
Alkalinity	mg/L							
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.03		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/13/97

Run #: 24

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	< 5.0		< 5.0				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu							
Alkalinity	mg/L							
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.013		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/14/97

Run #: 25

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	< 5.0		< 5.0				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu							
Alkalinity	mg/L							
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.022		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/29/97

Run#26

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	<15		<17				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu	80		45				
Alkalinity	mg/L							
Conductivity	µmhos/cm	770		790				
Total Dissolved Solids (TDS)	mg/L	530		580				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.06		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L	0.05		<0.050				
TKN	mg/L	2.5		1.9				
Ammonia	mg/L	0.56		0.52				
Nitrate-Nitrite	mg/L	0.38		0.44				
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/30/97

Run# 27

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	11		<5				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu	75		30				
Alkalinity	mg/L							
Conductivity	µmhos/cm	580		620				
Total Dissolved Solids (TDS)	mg/L	500		530				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.06		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L	0.06		<0.050				
TKN	mg/L	1.7		1.1				
Ammonia	mg/L	0.11		0.11				
Nitrate-Nitrite	mg/L	0.46		0.47				
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 1/31/97

Run # 28

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	8.7		<5.0				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cp							
Alkalinity	mg/L							
Conductivity	µmhos/cm	560		640				
Total Dissolved Solids (TDS)	mg/L	380		440				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.056		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L	<0.050		<0.050				
TKN	mg/L	1.7		1.2				
Ammonia	mg/L	0.26		0.28				
Nitrate-Nitrite	mg/L	0.32		0.27				
<b>ANIONS</b>								
Sulfate	mg/L	42		31				
Chloride	mg/L	88		110				
<b>CATIONS</b>								
Reactive Silica	mg/L	10		10				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 2/5/97

Run #: 29

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	< 5.0		< 5.0				
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu	150		80				
Alkalinity	mg/L							
Conductivity	µmhos/cm	1100		1100				
Total Dissolved Solids (TDS)	mg/L	670		630				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.02		<0.006				
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L	<0.050		<0.050				
TKN	mg/L	2.7		2.5				
Ammonia	mg/L	1.1		1.1				
Nitrate-Nitrite	mg/L	< 0.050		< 0.050				
<b>ANIONS</b>								
Sulfate	mg/L	56		49				
Chloride	mg/L	150		210				
<b>CATIONS</b>								
Reactive Silica	mg/L	22		21				
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L							
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 2/6/97

Run #: 30

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	10		< 5.0	61	3000		
Total Organic Carbon	mg/L	28		25				
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cμ	100		80				
Alkalinity	mg/L	230		200				
Conductivity	μmhos/cm	900		940				
Total Dissolved Solids (TDS)	mg/L	560		590				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.09		0.017	0.022	0.048	0.52	
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L	<0.050		<0.050	<0.050	0.33		
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L	63		67	39	54		
Chloride	mg/L	160		150	170	200		
<b>CATIONS</b>								
Reactive Silica	mg/L	18		18	16	48		
Sodium	mg/L	91		88	100	110	1200	
Zinc	mg/L							
Aluminum	mg/L	< 0.20		< 0.20	0.2	15	1.7	
Calcium	mg/L	70		69	80	330	69	
Iron	mg/L	0.16		0.071	25	930	72	
Magnesium	mg/L	22		22	22	67	20	
Manganese	mg/L	<0.010		0.018	0.043	0.59	0.017	
Mercury	mg/L							
Molybdenum	mg/L	<0.010		<0.010	<0.010	0.048	0.036	
Potassium	mg/L	10		9.5	7.9	11	9.6	
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	μg/L							
Atrazine	μg/L							
2,4-D	μg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 2/7/97

Run #: 31

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	10		6.3	150	9700		
Total Organic Carbon	mg/L	26		22	40	1000		
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu			120				
Alkalinity	mg/L			320				
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L			660				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.044		<0.006	0.017	2.3		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L			0.091	23	4100		
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 2/10/97

Run# 32

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	8.3		< 5.0				
Total Organic Carbon	mg/L			21				
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cp			80				
Alkalinity	mg/L			210				
Conductivity	µmhos/cm			900				
Total Dissolved Solids (TDS)	mg/L			420				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.044		<0.006				<0.060
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L	<0.050		<0.050			1.7	
TKN	mg/L	2.5		1.9				
Ammonia	mg/L	0.75		0.5				
Nitrate-Nitrite	mg/L	0.084		0.084				
<b>ANIONS</b>								
Sulfate	mg/L			45				
Chloride	mg/L			160				
<b>CATIONS</b>								
Reactive Silica	mg/L			20				
Sodium	mg/L			76				
Zinc	mg/L							
Aluminum	mg/L			0.22				
Calcium	mg/L			55				
Iron	mg/L	0.12						
Magnesium	mg/L			17				
Manganese	mg/L			0.014				
Mercury	mg/L							
Molybdenum	mg/L			< 0.010				
Potassium	mg/L			6.3				
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 2/11/97

Run# 33

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L				50	12000		
Total Organic Carbon	mg/L							
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cp							
Alkalinity	mg/L							
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L							
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L	0.018		<0.006	<0.006	0.45		< 0.10
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L				<0.05	<.1		
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L				55	89		
Chloride	mg/L				130	130		
<b>CATIONS</b>								
Reactive Silica	mg/L				14	<500		
Sodium	mg/L				92	94		
Zinc	mg/L				<0.020	0.49		
Aluminum	mg/L				<0.20	31		
Calcium	mg/L				69	1100		
Iron	mg/L				20	3400		
Magnesium	mg/L				20	150		
Manganese	mg/L				0.022	1.9		
Mercury	mg/L							
Molybdenum	mg/L				<0.010	0.12		
Potassium	mg/L				7.9	14		
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 2/12/97

Run# 34

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution
<b>CONVENTIONAL PARAMETERS</b>								
Total Suspended Solids (TSS)	mg/L	<5.0		<5.0	100	5200		
Total Organic Carbon	mg/L			28				
pH	Standard							
Temperature	Degrees C							
Dissolved Oxygen	mg/L							
Color	cu			100				
Alkalinity	mg/L			250				
Conductivity	µmhos/cm							
Total Dissolved Solids (TDS)	mg/L			1000				
<b>NUTRIENTS</b>								
Total Phosphorus	mg/L			<0.006	0.02	1.3		
Total Dissolved Phosphorus	mg/L							
Soluble Reactive Phosphorus	mg/L							
TKN	mg/L							
Ammonia	mg/L							
Nitrate-Nitrite	mg/L							
<b>ANIONS</b>								
Sulfate	mg/L							
Chloride	mg/L							
<b>CATIONS</b>								
Reactive Silica	mg/L							
Sodium	mg/L							
Zinc	mg/L							
Aluminum	mg/L							
Calcium	mg/L							
Iron	mg/L			0.18	21	2000		
Magnesium	mg/L							
Manganese	mg/L							
Mercury	mg/L							
Molybdenum	mg/L							
Potassium	mg/L							
<b>HERBICIDES &amp; PESTICIDES</b>								
Ametryn	µg/L							
Atrazine	µg/L							
2,4-D	µg/L							

Notes:

1. < = Below laboratory method detection limit

2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 2/13/97

Run #: 35

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Prefilter Backwash
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L								
Total Organic Carbon	mg/L								
pH	Standard								
Temperature	Degrees C								
Dissolved Oxygen	mg/L								
Color	cu								
Alkalinity	mg/L								
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L								
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L								< 0.010
Total Dissolved Phosphorus	mg/L								
Soluble Reactive Phosphorus	mg/L	<0.050		<0.050	0.42		1.2		
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulfate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L								
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

Notes:

1. < = Below laboratory method detection limit

2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 2/14/97

Run# 36

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0		<5.0	38	<5.0			
Total Organic Carbon	mg/L			32					
pH	Standard								
Temperature	Degrees C								
Dissolved Oxygen	mg/L								
Color	cμ			180					
Alkalinity	mg/L			280					
Conductivity	μmhos/cm								
Total Dissolved Solids (TDS)	mg/L			650					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	<0.006		0.017	<0.006	0.053			
Total Dissolved Phosphorus	mg/L								
Soluble Reactive Phosphorus	mg/L	<0.05		<0.05	<0.05				
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulfate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L			0.091	16	4300			
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	μg/L								
Atrazine	μg/L								
2,4-D	μg/L								

Notes:

1. < = Below laboratory method detection limit

2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 3/21/97

Run #: 37

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5	<5	<5		400			
Total Organic Carbon	mg/L		32	30					
pH	Standard								
Temperature	Degrees C								*26.11
Dissolved Oxygen	mg/L								
Color	cu		180	150					
Alkalinity	mg/L		200	200					
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L		650	620					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.025	0.023	0.0067	0.44				
Total Dissolved Phosphorus	GPM								
Soluble Reactive Phosphorus	Standard								
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		1.7	0.06	61				
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\* = Avg. Temp

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 3/24/97

Run #: 38

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0					<5.0
Total Organic Carbon	mg/L		30	29					
pH	Standard								
Temperature	Degrees C								*25
Dissolved Oxygen	mg/L								
Color	cu		200	175					
Alkalinity	mg/L		220	220					
Conductivity	µmhos/cm		944	968					
Total Dissolved Solids (TDS)	mg/L		670	640					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.022	0.022	0.008					0.007
Total Dissolved Phosphorus	GPM								
Soluble Reactive Phosphorus	Standard		0.062	<0.008					
TKN	mg/L		2.2	1.9					
Ammonia	mg/L	0.095	0.049	0.095					
Nitrate-Nitrite	mg/L		0.15	0.053					
<b>ANIONS</b>									
Sulphate	mg/L		48	46					
Chloride	mg/L		160	160					
<b>CATIONS</b>									
Reactive Silica	mg/L		14	13					
Sodium	mg/L		94	100					
Zinc	mg/L		<0.02	<0.02					
Aluminum	mg/L		<0.2	<0.2					
Calcium	mg/L		50	56					
Iron	mg/L	<0.05	1.5	0.052					<0.05
Magnesium	mg/L		17	19					
Manganese	mg/L		<0.01	<0.01					
Mercury	mg/L								
Molybdenum	mg/L		<0.01	<0.01					
Potassium	mg/L		7	7.7					
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L			<2.0					
Atrazine	µg/L			<2.0					
2,4-D	µg/L			<0.50					

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 3/25/97

Run #: 38a

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L				120	8000			
Total Organic Carbon	mg/L								
pH	Standard								
Temperature	Degrees C								
Dissolved Oxygen	mg/L								
Color	cu								
Alkalinity	mg/L								
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L								
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L				0.29	14			
Total Dissolved Phosphorus	GPM				0.046				
Soluble Reactive Phosphorus	Standard				<0.008	0.19			
TKN	mg/L				4.7	140			
Ammonia	mg/L				0.089	2.4			
Nitrate-Nitrite	mg/L				0.096	<0.030			
<b>ANIONS</b>									
Sulphate	mg/L				49	34			
Chloride	mg/L				160	180			
<b>CATIONS</b>									
Reactive Silica	mg/L				<50	<250			
Sodium	mg/L				110	110			
Zinc	mg/L				<0.020	0.33			
Aluminum	mg/L				0.36	23			
Calcium	mg/L				65	850			
Iron	mg/L				23	1900			
Magnesium	mg/L				21	130			
Manganese	mg/L				0.023	1.4			
Mercury	mg/L								
Molybdenum	mg/L				<0.010	0.037			
Potassium	mg/L				7.7	12			
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 3/25/97

Run #: 39

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	48	10,000			<5
Total Organic Carbon	mg/L		31						
pH	Standard								
Temperature	Degrees C								*26.1
Dissolved Oxygen	mg/L								
Color	cu		300	200					
Alkalinity	mg/L		200	190					
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L		580	560					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.021	0.025	0.027	0.2	18	90		0.0058
Total Dissolved Phosphorus	mg/L	0.017	0.026	0.026	0.1		88		
Soluble Reactive Phosphorus	mg/L	0.01	<0.008	0.038	0.031		120		
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		1.6	<0.05	14	2500			
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers
3. Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 4/1/97

Run #: 41

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L								
Total Organic Carbon	mg/L								
pH	Standard								
Temperature	Degrees C								*27.78
Dissolved Oxygen	mg/L								
Color	cu								
Alkalinity	mg/L								
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L								
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L								
Total Dissolved Phosphorus	mg/L	0.02	0.016	0.011	0.052		100		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	0.01	0.022		92		
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L								
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\* = Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 4/2/97

Run #: 42

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	66	3800			<5.0
Total Organic Carbon	mg/L		38	51					
pH	Standard								
Temperature	Degrees C								*25
Dissolved Oxygen	mg/L								
Color	cu		175	150					
Alkalinity	mg/L		200	200					
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L		670	620					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.018	0.024	0.01	0.28	9.8			0.01
Total Dissolved Phosphorus	mg/L								
Soluble Reactive Phosphorus	mg/L								
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		1.1	0.28	18	500			0.052
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collection: 04/10/97

Run #: 45

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	160	3500			<5.0
Total Organic Carbon	mg/L		31	29					
pH	Standard								
Temperature	Degrees C								*25.6
Dissolved Oxygen	mg/L								
Color	cu		200	150					
Alkalinity	mg/L				190	2000			
Conductivity	µmhos/cm		910	900					
Total Dissolved Solids (TDS)	mg/L		570	540					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.02	0.022	0.011	0.287	9.3	4.6		0.034
Total Dissolved Phosphorus	mg/L	0.059	0.019	0.0076	0.093		5.5		0.0079
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.014	0.25	2.4		<0.0080
TKN	mg/L	2.1	2	1.9	4.9	86			
Ammonia	mg/L	0.074	<0.030	0.06	0.2	1.9			
Nitrate-Nitrite	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050			
<b>ANIONS</b>									
Sulphate	mg/L		53	44	60	25			
Chloride	mg/L		180	180	180	260			
<b>CATIONS</b>									
Reactive Silica	mg/L		15	14	18	95			
Sodium	mg/L	120	120	120	110	110			110
Zinc	mg/L	<0.020	<0.020	<0.020	0.063	0.31			<0.020
Aluminum	mg/L	<0.20	<0.20	<0.20	0.39	17			<0.20
Calcium	mg/L	48	37	37	48	480			37
Iron	mg/L	<0.050	1.4	0.1	32	1300			0.69
Magnesium	mg/L	22	19	19	21	91			19
Manganese	mg/L	<0.010	0.012	0.016	0.041	1.1			<0.010
Mercury	mg/L								
Molybdenum	mg/L	<0.010	<0.010	<0.010	<0.010	0.04			<0.010
Potassium	mg/L	7.8	8.5	8.8	9	11			8.4
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L		<2.0	<2.0					<2.0
Atrazine	µg/L		<2.0	<2.0					<2.0
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers
3. Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 04/11/97

Run #: 46

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	76	3800			<5.0
Total Organic Carbon	mg/L	30		30					32
pH	Standard								
Temperature	Degrees C								*24.4
Dissolved Oxygen	mg/L								
Color	cu	175		175					175
Alkalinity	mg/L	170		170					170
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L	540		560					530
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.011	0.038	0.01	0.16	12	1.8		0.0091
Total Dissolved Phosphorus	mg/L	0.019	0.023	0.0061	0.12	0.46	0.042		0.014
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.014	0.43			<0.0080
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		1	0.094	24	1300			0.094
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 04/15/97

Run #: 47

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	30		3000	30	3000			<5.0
Total Organic Carbon	mg/L	32							33
pH	Standard								
Temperature	Degrees C								*25
Dissolved Oxygen	mg/L								
Color	cu	175		150					150
Alkalinity	mg/L	160		240					160
Conductivity	µmhos/cm	880		880					880
Total Dissolved Solids (TDS)	mg/L	530		570					540
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.039			0.093	13			0.026
Total Dissolved Phosphorus	mg/L	0.038			0.068	29			0.01
Soluble Reactive Phosphorus	mg/L	<0.0080		<0.0080	<0.0080	0.12			<0.0080
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L	42		50	31	44			43
Chloride	mg/L	320		390	317	430			400
<b>CATIONS</b>									
Reactive Silica	mg/L	12			14	70			12
Sodium	mg/L			100	120	120			110
Zinc	mg/L			<0.020	<0.020	0.12			<0.020
Aluminum	mg/L			<0.20	<0.20	6.2			<0.20
Calcium	mg/L			38	44	230			39
Iron	mg/L	<0.050		0.14	9.5	640			0.096
Magnesium	mg/L			19	20	48			18
Manganese	mg/L			<0.010	0.018	0.68			<0.010
Mercury	mg/L								
Molybdenum	mg/L			<0.010	<0.010	0.021			<0.010
Potassium	mg/L			7.6	8.6	9.2			7.3
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 04/17/97

Run #: 48

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	5.7	<5.0	<5.0	31	3800			<5.0
Total Organic Carbon	mg/L	32		33					33
pH	Standard								
Temperature	Degrees C								*22.2
Dissolved Oxygen	mg/L								
Color	cu	175		175					175
Alkalinity	mg/L	180		190					180
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L	450		510					760
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.022	0.0079	0.0078	0.15	31			0.0069
Total Dissolved Phosphorus	mg/L	0.0059	0.009	0.0087	0.11	11	0.3		1.9
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.16	0.8		<0.0080
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		<0.050	0.1	4.5	320			0.16
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers
3. Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 04/18/97

Run #: 49

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	20	9900			<5.0
Total Organic Carbon	mg/L	33		32					34
pH	Standard								
Temperature	Degrees C								*23.9
Dissolved Oxygen	mg/L								
Color	cu	175		175					175
Alkalinity	mg/L	180		190					180
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L	320		600					570
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.029	0.022	0.014	0.097	14			0.012
Total Dissolved Phosphorus	mg/L	0.019	0.048	0.021	0.072	15			0.057
Soluble Reactive Phosphorus	mg/L	<0.0080	0.016	<0.0080	<0.0080	0.82			<0.0080
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		<0.050	<0.050	2.1	640			0.056
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 04/22/97

Run #: 50

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	6.7	<5.0	<5.0	58	21000			
Total Organic Carbon	mg/L	31		32					
pH	Standard								
Temperature	Degrees C								*27.2
Dissolved Oxygen	mg/L								
Color	cu	175		175					
Alkalinity	mg/L	180		190					
Conductivity	µmhos/cm	970		970					
Total Dissolved Solids (TDS)	mg/L	570		490					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.028	0.025	0.015	0.19	30	2.4		
Total Dissolved Phosphorus	mg/L	0.025	0.028	0.02	0.068	49	2.4		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.01	0.63	0.45		
TKN	mg/L	1.9		1.7	3.1	260			
Ammonia	mg/L	0.039	<0.030	<0.030	0.073	3.8			
Nitrate-Nitrite	mg/L	<0.050		<0.050	<0.050	<0.050			
<b>ANIONS</b>									
Sulphate	mg/L	51		53	54	62			
Chloride	mg/L	170		170	170	608			
<b>CATIONS</b>									
Reactive Silica	mg/L	16		15.7	16.3	<10			
Sodium	mg/L		120	120	110	120			
Zinc	mg/L		<0.020	<0.020	<0.020	0.62			
Aluminum	mg/L		<0.20	<0.20	0.31	46			
Calcium	mg/L		44	46	49	1400			
Iron	mg/L	<0.050	<0.050	<0.050	10	3400			
Magnesium	mg/L		20	20	20	180			
Manganese	mg/L		<0.010	<0.010	0.022	2.5			
Mercury	mg/L								
Molybdenum	mg/L		<0.010	<0.010	<0.010	0.062			
Potassium	mg/L		7.6	7.6	7.7	15			
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L			<2.0					
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 4/24/97

Run #: 51

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	63	22000			
Total Organic Carbon	mg/L	34		30					
pH	Standard								
Temperature	Degrees C								*26.1
Dissolved Oxygen	mg/L								
Color	cu	175		150					
Alkalinity	mg/L	180		170					
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L	570		630					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.029	0.023	0.011	0.18	44	3		
Total Dissolved Phosphorus	mg/L	0.026	0.025	0.014	0.072	59	2.3		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	6.8	14		
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulphate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		<0.050	<0.050	6.6	5200			
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 4/25/97

Run #: 52

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	5) Precipitated	6) Chemical	7) Membrane	8) Zenon
		Influent	Influent	Micro-filtered Effluent		Solids	Cleaning Backwash	Cleaning Solution	Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	110	8400			
Total Organic Carbon	mg/L	32		28					
pH	Standard								
Temperature	Degrees C								*24.4
Dissolved Oxygen	mg/L								
Color	cu	175		175					
Alkalinity	mg/L	170		160					
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L	650		580					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.022	0.021	0.011	0.13	44			
Total Dissolved Phosphorus	mg/L	0.011	0.012	0.0065	0.046	40			
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	0.9			
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulfate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		<0.050	<0.050	3.3	4600			
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 4/29/97

Run #: 53

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	130	23000			<5.0
Total Organic Carbon	mg/L	34		28	58	3700			33
pH	Standard								
Temperature	Degrees C								*25
Dissolved Oxygen	mg/L								
Color	cu	150		175					175
Alkalinity	mg/L	130		160					180
Conductivity	µmhos/cm	940		930					950
Total Dissolved Solids (TDS)	mg/L	620		560					610
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.024	0.028	0.0085	0.14	54	1.8		0.0084
Total Dissolved Phosphorus	mg/L	0.026	0.029	0.0095	0.17	51	1.8		0.018
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.019	0.76	<0.0080		<0.0080
TKN	mg/L	2.3		2	5.1	370			2
Ammonia	mg/L	0.081	0.038	0.09	0.1	6.1			0.06
Nitrate-Nitrite	mg/L	<0.050		<0.050	<0.050	<0.050			<0.050
<b>ANIONS</b>									
Sulfate	mg/L	50		65	72	45			59
Chloride	mg/L	160		170	170	93			170
<b>CATIONS</b>									
Reactive Silica	mg/L	17.1		17					16.9
Sodium	mg/L		130	130	130	120			110
Zinc	mg/L		<0.020	0.033	<0.020	0.91			<0.020
Aluminum	mg/L		<0.20	0.33	12	690			0.79
Calcium	mg/L		47	55	54	2100			46
Iron	mg/L	<0.050	<0.050	<0.050	0.15	4400			0.16
Magnesium	mg/L		21	25	27	240			22
Manganese	mg/L		<0.010	<0.010	0.028	4			<0.010
Mercury	mg/L								
Molybdenum	mg/L		<0.010	<0.010	<0.010	0.074			<0.010
Potassium	mg/L		7.4	9.2	9.7	16			7.7
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L		<1.0	<1.0					<1.0
Atrazine	µg/L		<2.0	<2.0					<2.0
2,4-D	µg/L		<0.50	<0.50					<0.50

Notes:

1. < = Below laboratory method detection limit

2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/2/97

Run #: 54

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	59	16300			
Total Organic Carbon	mg/L	36		32					
pH	Standard								
Temperature	Degrees C								*25.6
Dissolved Oxygen	mg/L								
Color	cu	200		175					
Alkalinity	mg/L	180		160					
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L	540		500					
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.016	0.019	0.012	0.24	55	2.1		
Total Dissolved Phosphorus	mg/L	0.023	0.016	0.02	0.043	43	2		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	0.3	0.014		
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulfate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		<0.050	<0.050	3	1800			
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

Notes:

1. < = Below laboratory method detection limit

2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/02/97

Run #: 55

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	5) Precipitated	6) Chemical	7) Membrane	8) Zenon
		Influent	Influent	Micro-filtered Effluent		Solids	Cleaning Backwash	Cleaning Solution	Permeate
<b>CONVENTIONAL PARAMETERS</b>									
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	48	14350			<5.0
Total Organic Carbon	mg/L	36		34					37
pH	Standard								
Temperature	Degrees C								*26.7
Dissolved Oxygen	mg/L								
Color	cu	250		250					250
Alkalinity	mg/L	170		170					150
Conductivity	µmhos/cm								
Total Dissolved Solids (TDS)	mg/L	550		590					490
<b>NUTRIENTS</b>									
Total Phosphorus	mg/L	0.018	0.023	0.017	0.16	48	1.8		0.012
Total Dissolved Phosphorus	mg/L	0.023	0.029	0.014	0.069	51	1.8		0.015
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	0.47	0.014		0.028
Phosphorus	mg/L								
TKN	mg/L								
Ammonia	mg/L								
Nitrate-Nitrite	mg/L								
<b>ANIONS</b>									
Sulfate	mg/L								
Chloride	mg/L								
<b>CATIONS</b>									
Reactive Silica	mg/L								
Sodium	mg/L								
Zinc	mg/L								
Aluminum	mg/L								
Calcium	mg/L								
Iron	mg/L		<0.050	<0.050	3.2	4800			0.061
Magnesium	mg/L								
Manganese	mg/L								
Mercury	mg/L								
Molybdenum	mg/L								
Potassium	mg/L								
<b>HERBICIDES &amp; PESTICIDES</b>									
Ametryn	µg/L								
Atrazine	µg/L								
2,4-D	µg/L								

\*=Avg. Temp

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/09/97

Run #: 57

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L	<5.0	5.3	<5.0	30	<5.0		1500			<5.0	<5.0	2300
Total Organic Carbon	mg/L	38		37							39		
pH	Standard												
Temperature	Degrees C										*24.5		
Dissolved Oxygen	mg/L												
Color	cu	175		175							175		
Alkalinity	mg/L	180		180							180		
Conductivity	µmhos/cm												
Total Dissolved Solids (TDS)	mg/L	440		430							420		
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.023	0.029	0.013	0.16	0.019		89			0.0092	0.13	6.4
Total Dissolved Phosphorus	mg/L	0.021	0.023	0.0085	0.08	0.013		85			0.011	0.085	5.8
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.011	<0.0080		2			<0.0080	<0.0080	<0.0080
TKN	mg/L												
Ammonia	mg/L												
Nitrate-Nitrite	mg/L												
<b>ANIONS</b>													
Sulfate	mg/L												
Chloride	mg/L												
<b>CATIONS</b>													
Reactive Silica	mg/L												
Sodium	mg/L												
Zinc	mg/L												
Aluminum	mg/L		0.25	0.43	1.8	<0.20		240			1.2	1.1	25
Calcium	mg/L												
Iron	mg/L		<0.050	<0.050	1.4	0.095		7400			<0.050	0.6	560
Magnesium	mg/L												
Manganese	mg/L												
Mercury	mg/L												
Molybdenum	mg/L												
Potassium	mg/L												
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	µg/L												
Atrazine	µg/L												
2,4-D	µg/L												

\*=Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/13/97

Run #: 59

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	29	21		6500			<5.0	14	7400
Total Organic Carbon	mg/L	36		31							33		
pH	Standard												
Temperature	Degrees C										*24.4		
Dissolved Oxygen	mg/L												
Color	cu	200		150							150		
Alkalinity	mg/L	170		160							160		
Conductivity	umhos/cm	970		990							980		
Total Dissolved Solids (TDS)	mg/L	300		320							420		
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.02	0.028	0.016	0.15	0.021		41			0.0084	0.14	7.8
Total Dissolved Phosphorus	mg/L	0.02	0.017	0.0062	0.068	0.012		43			0.01	0.08	7.4
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		0.36			<0.0080	<0.0080	0.48
TKN	mg/L	2.3		2	3.7	2.4		390			2	5	60
Ammonia	mg/L	0.072	0.092	0.098	0.11	0.053		3.6			0.074	0.19	1.6
Nitrate-Nitrite	mg/L	<0.050		<0.050	<0.050	0.062		<0.050			<0.050	<0.050	<0.050
<b>ANIONS</b>													
Sulfate	mg/L	48		58	44	45		49			63	53	67
Chloride	mg/L	170		170	170	180		200			170	170	170
<b>CATIONS</b>													
Reactive Silica	mg/L	15		15	13	12		14			13	12	16
Sodium	mg/L	110		120	120	120		110			120	120	120
Zinc	mg/L	<0.020		<0.020	0.036	<0.020		0.71			<0.020	0.076	0.73
Aluminum	mg/L	<0.20		0.39	1.5	0.31		580			0.89	2	64
Calcium	mg/L	43		45	50	46		1100			42	49	240
Iron	mg/L	<0.050		<0.050	0.59	0.051		1900			<0.050	0.62	410
Magnesium	mg/L	20		21	22	21		160			20	21	36
Manganese	mg/L	0.019		<0.010	0.067	<0.010		3.4			<0.010	0.077	3.8
Mercury	mg/L	<0.00020		<0.00020	<0.002	<0.002		0.0006			<0.002	<0.002	<0.002
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.035			<0.010	<0.010	<0.010
Potassium	mg/L	7.2		7.8	8	8.3		15			8	8.8	11
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	ug/L		<2.0	<2.0							<2.0		
Atrazine	ug/L		<2.0	<2.0							<2.0		
2,4-D	ug/L		<0.50	<0.50							<0.50		

\*=Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/15/97

Run #: 61

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-scringed	2) Screened	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Pta	Bleed	Bleed
		Influent	Influent	Micro-filtered	Effluent	4	5	Solids	Cleaning	Cleaning	Permeate		Tank	Tank
									Backwash	Solution			4	5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	15	<5.0		13000			<5.0	350	<5.0	4000
Total Organic Carbon	mg/L	36		30							32			
pH	Standard													
Temperature	Degrees C										*24.4			
Dissolved Oxygen	mg/L													
Color	cu	150		100							125			
Alkalinity	mg/L	140		160							140			
Conductivity	µmhos/cm													
Total Dissolved Solids (TDS)	mg/L	480		470							530			
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.016	0.027	0.009	0.13	0.016		31			0.0085		0.095	9.1
Total Dissolved Phosphorus	mg/L	0.013	0.017	<0.0040	0.035	0.016		34			0.0095		0.053	4.3
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		0.09			<0.0080		<0.0080	0.056
Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20		0.3	6.2	0.83		270			0.9		1.4	240
Calcium	mg/L													
Iron	mg/L	<0.050		<0.050	0.28	0.061		3000			0.088		0.11	280
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Altrazine	µg/L													
2,4-D	µg/L													

\*=Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/20/97

Run #: 63

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	PT	PT2	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	32	<5.0	93	12	100	610	34000			<5.0	30	3400
Total Organic Carbon	mg/L	34		31								35		
pH	Standard													
Temperature	Degrees C											*26.1		
Dissolved Oxygen	mg/L													
Color	cu	150		175								175		
Alkalinity	mg/L	220		200								190		
Conductivity	µmhos/cm	1000		1000								1000		
Turbidity	NTU	0.53	2.1	0.18	4.2	3.1	6.7	8.8	12000			1.3	0.9	720
Total Dissolved Solids (TDS)	mg/L	600		590								600		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.028	0.036	0.0052	0.13	0.023			120	5		0.0089	0.12	7.4
Total Dissolved Phosphorus	mg/L	0.018	0.026	0.01	0.045	0.012			120	4.8		0.015	0.062	7.5
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080			<0.40	<0.0080		<0.0080	<0.0080	<0.0080
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L	52		63	64	56			40			71	79	81
Chloride	mg/L	170		170	170	180			190			170	170	180
<b>CATIONS</b>														
Reactive Silica	mg/L	19		18	12	10			21			15	12	11
Sodium	mg/L	100		120	110	110			110			110	120	120
Zinc	mg/L	<0.020		<0.020	<0.020	<0.020			1.9			<0.020	0.24	0.5
Aluminum	mg/L	<0.20		0.32	4.8	0.52			330			1.1	1.6	170
Calcium	mg/L	50		54	41	44			3700			50	45	400
Iron	mg/L	<0.050		<0.050	1.4	<0.050			8400			<0.050	0.7	270
Magnesium	mg/L	20		22	21	22			600			21	22	44
Manganese	mg/L	<0.010		<0.010	0.029	<0.010			8.8			<0.010	0.05	4.5
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.0002			<0.002			<0.00020	<0.00020	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010			0.27			<0.010	<0.010	<0.010
Potassium	mg/L	6.7		7.5	6.7	7.5			20			7.3	7.9	11
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\*=Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/21/97

Run #: 64

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L												
Total Organic Carbon	mg/L	36		32							38		
pH	Standard												
Temperature	Degrees C										*27.2		
Dissolved Oxygen	mg/L												
Color	cu												
Alkalinity	mg/L												
Conductivity	umhos/cm												
Total Dissolved Solids (TDS)	mg/L												
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.019		0.0091							0.018		
Total Dissolved Phosphorus	mg/L												
Soluble Reactive Phosphorus	mg/L												
Phosphorus	mg/L												
TKN	mg/L												
Ammonia	mg/L												
Nitrate-Nitrite	mg/L												
<b>ANIONS</b>													
Sulphate	mg/L												
Chloride	mg/L												
<b>CATIONS</b>													
Reactive Silica	mg/L												
Sodium	mg/L												
Zinc	mg/L												
Aluminum	mg/L												
Calcium	mg/L												
Iron	mg/L												
Magnesium	mg/L												
Manganese	mg/L												
Mercury	mg/L												
Molybdenum	mg/L												
Potassium	mg/L												
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	ug/L												
Atrazine	ug/L												
2,4-D	ug/L												

\*=Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS														
Sample Collected: 5/22/97		Run #: 65		Savannah Laboratories & Environmental Services, Inc										
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Bleed Tank 4	Bleed Tank 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	Pta	PTb	8) Zenon Permeate	Elim. 4	Elim. 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	7	11	<5.0	41	15	4400	26000		350	280	<5.0	9	
Total Organic Carbon	mg/L	37		32								36		
pH	Standard													
Temperature	Degrees C											*29.4		
Dissolved Oxygen	mg/L													
Color	cu	200		175								200		
Alkalinity	mg/L	210		200								200		
Conductivity	umhos/cm													
Turbidity	NTU		1.5		6.9	3.4	900	2200		33	29		1.3	
Total Dissolved Solids (TDS)	mg/L	630		610								610		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.018	0.035	0.0086	0.1	0.081	6.9	64	0.0086			0.016	0.024	
Total Dissolved Phosphorus	mg/L	0.019	0.023	0.055	0.0098	0.049	7.5	63				0.018	0.016	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	0.038	0.056				<0.0080	<0.0080	
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20		0.33	4.4	1.7	370	1200				0.92	0.93	
Calcium	mg/L													
Iron	mg/L	<0.050		<0.050	0.28	0.058	110	2900				<0.050	<0.050	
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L													
Atrazine	ug/L													
2,4-D	ug/L													

\*=Avg. Temp.

- Notes:  
1. < = Below laboratory method detection limit  
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers  
3. Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/23/97

Run #: 66

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	PTa	PTb	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	5	7	7	30	5		25000			270		20	9200
Total Organic Carbon	mg/L	36		32										
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu	200		125										
Alkalinity	mg/L	210		200										
Conductivity	umhos/cm													
Turbidity	NTU	0.39	1.2	<0.10	3.8	1.2		3800			18.4		4	970
Total Dissolved Solids (TDS)	mg/L	590		600										
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.021	0.029	0.007	0.093	0.026		60					0.079	12
Total Dissolved Phosphorus	mg/L	0.016	0.025	0.0083	0.049	0.018		58			0.031		0.058	13
Soluble Reactive Phosphorus	mg/L	<0.0080		<0.0080	0.021	<0.0080		5.2			<0.0080		<0.0080	3.9
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20		0.42	4.1	0.8		1300					1.8	690
Calcium	mg/L													
Iron	mg/L	<0.050		<0.050	0.22	<0.050		3000					0.06	170
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L													
Atrazine	ug/L													
2,4-D	ug/L													

\*=Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS														
Started Ferric Chloride (Fe)		Run #: 68										Savannah Laboratories & Environmental Services, Inc.		
Sample Collected: 5/28/97														
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	Pta	PTb	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	24	<5.0	53	<5.0		5		118	520	<5.0	38000	7600
Total Organic Carbon	mg/L	37		19								36		
pH	Standard													
Temperature	Degrees C											*28.4		
Dissolved Oxygen	mg/L													
Color	cu	200		100								175		
Alkalinity	mg/L	200		140								160		
Conductivity	µmhos/cm	1000		1100								1000		
Turbidity	NTU	2	17	<0.10	5.7	1.6		16000		45	160	<0.10	2.5	1600
Total Dissolved Solids (TDS)	mg/L	600		580								610		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.025	0.022	0.0066	0.065	0.018	0.025	56				0.0099	0.05	11
Total Dissolved Phosphorus	mg/L	0.016	0.015	0.012	0.038	0.018		54				0.0086	0.048	10
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		0.078				<0.0080	<0.0080	0.034
TKN	mg/L	2.2		1.2	3	2.1		300				1.9	3.1	110
Ammonia	mg/L	<0.030	<0.030	0.061	<0.030	<0.030		7.8				0.045	<0.030	3.8
Nitrate-Nitrite	mg/L	<0.050		<0.050	<0.050	<0.050		1.6				<0.050	<0.050	0.73
<b>ANIONS</b>														
Sulphate	mg/L	64		60	64	65		18				62	71	64
Chloride	mg/L	180		220	180	170		860				190	170	260
<b>CATIONS</b>														
Reactive Silica	mg/L	22		19	15	17		88				19	2.2	11
Sodium	mg/L	120		100	120	120		140				100	130	140
Zinc	mg/L	<0.020		<0.020	<0.020	0.03		1.6				<0.020	<0.020	0.62
Aluminum	mg/L	<0.20		<0.20	0.83	0.33		1400				<0.20	0.42	1000
Calcium	mg/L	53		47	56	50		3100				46	52	670
Iron	mg/L	<0.050		0.1	2.7	<0.050		5000				0.14	<0.050	270
Magnesium	mg/L	22		20	23	21		410				20	22	91
Manganese	mg/L	0.013		0.073	0.031	<0.010		9.4				0.011	0.027	9.8
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		0.0014				<0.00020	<0.00020	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.12				<0.010	<0.010	<0.010
Potassium	mg/L	8.6		7.3	8.5	7.9		25				7.1	8.2	17
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L	<1.0		<1.0								<1.0		
Atrazine	µg/L	<1.0		<1.0								<1.0		
2,4-D	µg/L	<0.50		<0.50								<0.50		

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/29/97

Run #: 69

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	PTb	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	5					420				<5.0		
Total Organic Carbon	mg/L	33										29		
pH	Standard													
Temperature	Degrees C											*29.4		
Dissolved Oxygen	mg/L													
Color	cu	175										175		
Alkalinity	mg/L	190										170		
Conductivity	µmhos/cm													
Turbidity	NTU	1.1	1					82				<0.10		
Total Dissolved Solids (TDS)	mg/L	650										660		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.014	0.024							0.38		0.01		0.01
Total Dissolved Phosphorus	mg/L	0.019	0.014							0.36		0.0075		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080							<0.04		<0.0080		
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulphate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20										<0.20		
Calcium	mg/L													
Iron	mg/L	<0.050										<0.050		
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/30/97

Run #: 69b

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Pta	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate
<b>CONVENTIONAL PARAMETERS</b>										
Total Suspended Solids (TSS)	mg/L	<5.0	5			1000				<5.0
Total Organic Carbon	mg/L	36								30
pH	Standard									
Temperature	Degrees C									
Dissolved Oxygen	mg/L									
Color	cu	175								50
Alkalinity	mg/L	200								120
Conductivity	µmhos/cm									
Turbidity	NTU	1.4	1			240				0.15
Total Dissolved Solids (TDS)	mg/L	640								590
<b>NUTRIENTS</b>										
Total Phosphorus	mg/L	0.02	0.023					0.96		0.011
Total Dissolved Phosphorus	mg/L	0.019	0.021					0.92		0.0093
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080					<0.080		<0.008
TKN	mg/L									
Ammonia	mg/L									
Nitrate-Nitrite	mg/L									
<b>ANIONS</b>										
Sulphate	mg/L									
Chloride	mg/L									
<b>CATIONS</b>										
Reactive Silica	mg/L									
Sodium	mg/L									
Zinc	mg/L									
Aluminum	mg/L	<0.20								<0.20
Calcium	mg/L									
Iron	mg/L	<0.050								<0.050
Magnesium	mg/L									
Manganese	mg/L									
Mercury	mg/L									
Molybdenum	mg/L									
Potassium	mg/L									
<b>HERBICIDES &amp; PESTICIDES</b>										
Ametryn	µg/L									
Atrazine	µg/L									
2,4-D	µg/L									

Notes:

1. < = Below laboratory method detection limit

2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 5/31/97      Run #: 70      Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	Pta	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	170	5		1000	29000			<5.0	46	14000
Total Organic Carbon	mg/L	14		28								37		
pH	Standard													
Temperature	Degrees C											*27.2		
Dissolved Oxygen	mg/L													
Color	cu	200		90								100		
Alkalinity	mg/L	200		160								160		
Conductivity	µmhos/cm													
Turbidity	NTU	2	2.1	1.5	7.6	6.7		280	12000			0.26	32	3400
Total Dissolved Solids (TDS)	mg/L	620		590								590		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.036	0.026	0.013	0.071	0.024			84			0.0048	0.073	18
Total Dissolved Phosphorus	mg/L	0.019	0.022	<0.0040	0.05	0.019			69			0.0098	0.038	16
Soluble Reactive Phosphorus	mg/L	<0.008	<0.008	<0.008	<0.008	<0.008			<0.008			<0.008	<0.008	<0.008
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulphate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20			830			0.48	<0.20	880
Calcium	mg/L													
Iron	mg/L	<0.050		0.078	77	2.8			6700			3	14	2500
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/03/97      Run #: 72      Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	11	<5.0	44	7		29000	570			<5.0	94	20000
Total Organic Carbon	mg/L	35		17								25		
pH	Standard													
Temperature	Degrees C											*25.3		
Dissolved Oxygen	mg/L													
Color	cu	175		40								70		
Alkalinity	mg/L	170		100								94		
Conductivity	µmhos/cm	890		970								940		
Turbidity	NTU	1.4	8.6	0.21	16	2.7		4400	110			<0.10	32	2300
Total Dissolved Solids (TDS)	mg/L	520		500								510		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.024	0.039	<0.0040	0.082	0.031		42				0.01	0.07	15
Total Dissolved Phosphorus	mg/L	0.025	0.029	0.013	0.065	0.017		41				0.016	0.032	15
Soluble Reactive Phosphorus	mg/L	<0.008	<0.008	<0.008	<0.008	<0.008		<0.08				<0.008	<0.008	<0.008
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulphate	mg/L	57		51	63	65		70				52	59	28
Chloride	mg/L	150		210	170	190		200				210	200	220
<b>CATIONS</b>														
Reactive Silica	mg/L	19		19	15	18		<20				17	11	<10
Sodium	mg/L	96		95	98	110		130				100	98	120
Zinc	mg/L	<0.020		<0.020	0.024	<0.020		0.74				<0.020	<0.020	0.78
Aluminum	mg/L	<0.20		<0.20	<0.20	0.35		1500				0.25	<0.20	600
Calcium	mg/L	41		42	46	49		1300				41	41	780
Iron	mg/L	<0.050		0.069	16	2.1		4100				<0.050	32	2700
Magnesium	mg/L	19		19	19	22		180				19	19	100
Manganese	mg/L	<0.010		0.096	0.037	0.013		7.4				0.083	0.092	12
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		0.00021				<0.00020	<0.00020	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.22				<0.010	<0.010	0.034
Potassium	mg/L	7.4		7.3	8	7.3		76				7.6	6.6	16
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\*=Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/4/97

Run #: 73

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	Pta	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	16	<5.0					940			<5.0		
Total Organic Carbon	mg/L	32		20								17		
pH	Standard													
Temperature	Degrees C											*28.3		
Dissolved Oxygen	mg/L													
Color	cu	175		45								150		
Alkalinity	mg/L	170		110								56		
Conductivity	µmhos/cm													
Turbidity	NTU	1.3	19	0.16				350				1.9		
Total Dissolved Solids (TDS)	mg/L	470		490								530		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.03	0.036	0.013								0.013		
Total Dissolved Phosphorus	mg/L	0.026	0.026	0.011								0.018		
Soluble Reactive Phosphorus	mg/L	<0.008	<0.008	<0.008								<0.008		
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulphate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20		<0.20								0.77		
Calcium	mg/L													
Iron	mg/L	<0.050		<0.050								5.4		
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/9/97

Run #: 76

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L												
Total Organic Carbon	mg/L	34		34							36		
pH	Standard	7.38		7.28							7.84		
Temperature	Degrees C										*27.2		
Dissolved Oxygen	mg/L												
Color	cu												
Alkalinity	mg/L												
Conductivity	µmhos/cm	880		880							880		
Turbidity	NTU												
Total Dissolved Solids (TDS)	mg/L												
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.023		0.0084					0.062		0.017		
Total Dissolved Phosphorus	mg/L	0.016	0.03	0.032					0.069		0.037		
Soluble Reactive Phosphorus	mg/L	0.011	0.009	<0.008					0.011		0.011		
TKN	mg/L												
Ammonia	mg/L												
Nitrate-Nitrite	mg/L												
<b>ANIONS</b>													
Sulphate	mg/L												
Chloride	mg/L												
<b>CATIONS</b>													
Reactive Silica	mg/L												
Sodium	mg/L												
Zinc	mg/L												
Aluminum	mg/L												
Calcium	mg/L												
Iron	mg/L												
Magnesium	mg/L												
Manganese	mg/L												
Mercury	mg/L												
Molybdenum	mg/L												
Potassium	mg/L												
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	µg/L												
Atrazine	µg/L												
2,4-D	µg/L												

\* = Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers  
 3. Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/10/97 Run #: 77 Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	5.5	<5.0	5	27	<5.0		27000	100			<5.0	12	18000
Total Organic Carbon	mg/L	32		30								31		
pH	Standard													
Temperature	Degrees C											*26.11		
Dissolved Oxygen	mg/L													
Color	cu	175		175								175		
Alkalinity	mg/L	180		170								170		
Conductivity	umhos/cm	34000		910								900		
Turbidity	NTU	1.1	1.4	0.21	14	5.4		4700	46			0.21	9500	2.1
Total Dissolved Solids (TDS)	mg/L	540		520								470		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.024	0.0071	0.0044	0.089	0.018		44				0.0057	0.066	12
Total Dissolved Phosphorus	mg/L	0.013	0.014	0.0083	0.093	0.013		43				0.016	0.03	12
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.015	<0.008		0.11				<0.0080	<0.008	<0.040
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L	49		35	38	58		35				52	43	48
Chloride	mg/L	170		170	170	170		200				170	190	200
<b>CATIONS</b>														
Reactive Silica	mg/L	18		20	16	14		15				16	16	<2.0
Sodium	mg/L	99		100	100	100		110				100	99	110
Zinc	mg/L	<0.020		<0.020	<0.020	<0.020		1.4				<0.020	<0.020	0.62
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		2100				<0.20	<0.20	370
Calcium	mg/L	40		43	46	45		2000				41	40	540
Iron	mg/L	<0.050		0.07	8	0.88		6300				0.15	2.4	4200
Copper	mg/L	<0.025		<0.025	<0.025	<0.025		1.3				<0.025	<0.025	0.7
Magnesium	mg/L	19		20	21	20		260				19	19	80
Manganese	mg/L	0.011		0.01	0.03	<0.010		11				<0.010	<0.010	10
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		<0.00020				<0.00020	<0.00020	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.31				<0.010	<0.010	0.12
Potassium	mg/L	6.3		6.4	7.2	6.6		20				6.5	6.4	12
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L													
Atrazine	ug/L													
2,4-D	ug/L													

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/11/97

Run #: 78

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L												
Total Organic Carbon	mg/L	31		31							32		
pH	Standard												
Temperature	Degrees C												
Dissolved Oxygen	mg/L												
Color	cu												
Alkalinity	mg/L												
Conductivity	µmhos/cm												
Turbidity	NTU												
Total Dissolved Solids (TDS)	mg/L												
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.017	0.013	0.012							0.0064		
Total Dissolved Phosphorus	mg/L	0.018	0.016	0.0061							0.012		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080		
TKN	mg/L												
Ammonia	mg/L												
Nitrate-Nitrite	mg/L												
<b>ANIONS</b>													
Sulfate	mg/L												
Chloride	mg/L												
<b>CATIONS</b>													
Reactive Silica	mg/L												
Sodium	mg/L												
Zinc	mg/L												
Aluminum	mg/L												
Calcium	mg/L												
Iron	mg/L												
Magnesium	mg/L												
Manganese	mg/L												
Mercury	mg/L												
Molybdenum	mg/L												
Potassium	mg/L												
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	µg/L												
Atrazine	µg/L												
2,4-D	µg/L												

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/13/97		Run #: 79		Savannah Laboratories & Environmental Services, Inc										
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	6	25	<5.0	23	8		35000	160			5	24	17000
Total Solids	mg/L	560	530	520	590	580		31000	650			540	550	15000
Total Organic Carbon	mg/L	30		29								29		
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu	150		165								165		
Alkalinity	mg/L	170		160								160		
Conductivity	µmhos/cm													
Turbidity	NTU	1.1	1.6	0.29	13	2		12000	47			0.22	8	4400
Total Dissolved Solids (TDS)	mg/L	550		490								520		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.019	0.016	0.0066	0.076	0.017		84				0.0077	0.077	21
Total Dissolved Phosphorus	mg/L	0.013	0.017	0.0081	0.042	0.013		63				0.0062	0.036	18
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.0080				<0.0080	0.012	<0.0080
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20		610				<0.20	<0.20	640
Calcium	mg/L													
Iron	mg/L	<0.050	1.2	<0.050	7.4	0.74		2800				0.06	5.2	3400
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/13/97 Run #: 80 Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	5	<5.0	76	8		35000	220			<5.0	32	18000
Total Solids	mg/L	590	560	540	620	570		30000	780			550	610	17000
Total Organic Carbon	mg/L	32		30								32		
pH	Standard													
Temperature	Degrees C											*27.8		
Dissolved Oxygen	mg/L													
Color	cu	165		150								150		
Alkalinity	mg/L	180		170								160		
Conductivity	umhos/cm													
Turbidity	NTU	0.82	1.7	0.31	24	2		8100	60			0.21	6.6	4700
Total Dissolved Solids (TDS)	mg/L	570		530								530		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.017	0.1	0.0076	0.1	0.017		38				0.015	0.067	14
Total Dissolved Phosphorus	mg/L	0.016	0.013	0.0097	0.049	0.014		50				0.094	0.038	15
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.0080				<0.0080	<0.0080	<0.0080
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20		1600				<0.2	<0.2	280
Calcium	mg/L													
Iron	mg/L	<0.050	1.3	<0.050	21	0.89		5700				<0.050	4.4	5200
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L													
Atrazine	ug/L													
2,4-D	ug/L													

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers  
 3. Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/17/97 Run #: 82 Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	14	<5.0		29000	370			<5.0	17	20000
Total Solids	mg/L	580	630	600	610	610		26000	940			550	620	19000
Total Organic Carbon	mg/L	35		32								32		
pH	Standard													
Temperature	Degrees C											*29.9		
Dissolved Oxygen	mg/L													
Color	cu	175		150								175		
Alkalinity	mg/L	190		180								180		
Conductivity	umhos/cm	930		940								940		
Turbidity	NTU	0.6	2.1	0.29	12	2.1		12000	96			0.24	6.9	5300
Total Dissolved Solids (TDS)	mg/L	550		590								590		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.022	0.023	0.0097	0.075	0.023		61				0.0085	0.057	14
Total Dissolved Phosphorus	mg/L	0.018	0.025	0.016	0.047	0.0059		69				0.018	0.022	13
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.016				<0.0080	<0.0080	<0.040
TKN	mg/L	1.9		1.6	2.7	1.9		62				1.5	2.3	140
Ammonia	mg/L	<0.030	<0.030	<0.030	0.13	0.038		11				<0.030	0.045	12
Nitrate-Nitrite	mg/L	<0.050		<0.050	0.059	<0.050		0.98				<0.050	<0.050	1
<b>ANIONS</b>														
Sulfate	mg/L	54		50	51	52		19				50	50	41
Chloride	mg/L	170		170	170	170		140				180	200	93
<b>CATIONS</b>														
Reactive Silica	mg/L	13		17	11	11		<10				11	8.8	1.3
Sodium	mg/L	100	100	110	100	98		110				98	100	100
Zinc	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020		0.83				<0.020	<0.020	0.76
Aluminum	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20		990				<0.20	<0.20	360
Calcium	mg/L	43	45	45	48	42		1300				42	44	660
Iron	mg/L	<0.050	1.7	<0.050	10	0.78		2900				0.1	5.6	5000
Copper	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025		0.55				<0.025	<0.025	0.81
Magnesium	mg/L	20	21	21	22	20		180				20	21	94
Manganese	mg/L	<0.010	0.019	0.014	0.028	<0.010		7.5				<0.010	0.014	15
Mercury	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020		0.00044				<0.000020	<0.000020	<0.000020
Molybdenum	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010		0.083				<0.010	<0.010	0.16
Potassium	mg/L	6.2	6.6	5.9	7.1	6.4		15				6.4	6.7	11
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L	<2.0		<2.0								<2.0		
Atrazine	ug/L	<2.0		<2.0								<2.0		
2,4-D	ug/L	<0.50		<0.50								<0.50		

\* = Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/18/97 Run #: 83 Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L									530				
Total Solids	mg/L									1100				
Total Organic Carbon	mg/L	35		33								35		
pH	Standard													
Temperature	Degrees C											*28.9		
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	umhos/cm													
Turbidity	NTU									150				
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.016	0.014	0.0045								0.006		
Total Dissolved Phosphorus	mg/L	0.014	0.011	0.0077								0.016		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080								<0.0080		
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L													
Atrazine	ug/L													
2,4-D	ug/L													

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/19/97 Run #: 84 Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	6.5	6	<5.0	48	<5.0		39000	560			5	14	20000
Total Solids	mg/L	560	590	570	650	580		33000	1100			560	620	20000
Total Organic Carbon	mg/L	35		34								31		
pH	Standard													
Temperature	Degrees C											*28.3		
Dissolved Oxygen	mg/L													
Color	cu	175		175								175		
Alkalinity	mg/L	190		180								170		
Conductivity	umhos/cm													
Turbidity	NTU	0.81	1.6	0.41	24	2.1		11000	120			0.46	3.7	5300
Total Dissolved Solids (TDS)	mg/L	520		530								500		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.014	0.015	<0.0040	0.094	0.015		50				0.012	0.038	26
Total Dissolved Phosphorus	mg/L	<0.0040	0.016	0.0055	0.041	0.0069		54				<0.0040	0.023	25
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.16				<0.0080	<0.0080	<0.16
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		1900				<0.20	<0.20	830
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L	<0.050		<0.050	18	0.95		5300				0.061	2.3	3600
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L													
Atrazine	ug/L													
2,4-D	ug/L													

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 6/30/97

Run #: 85

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L												
Total Solids	mg/L												
Total Organic Carbon	mg/L	38		35							36		
pH	Standard												
Temperature	Degrees C										*27.2		
Dissolved Oxygen	mg/L												
Color	cu												
Alkalinity	mg/L												
Conductivity	µmhos/cm												
Turbidity	NTU												
Total Dissolved Solids (TDS)	mg/L												
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.022	0.021	<0.0040							<0.0040		
Total Dissolved Phosphorus	mg/L	0.0083	0.018	0.0046							0.0083		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080		
TKN	mg/L												
Ammonia	mg/L												
Nitrate-Nitrite	mg/L												
<b>ANIONS</b>													
Sulfate	mg/L												
Chloride	mg/L												
<b>CATIONS</b>													
Reactive Silica	mg/L												
Sodium	mg/L												
Zinc	mg/L												
Aluminum	mg/L												
Calcium	mg/L												
Copper	mg/L												
Iron	mg/L												
Magnesium	mg/L												
Manganese	mg/L												
Mercury	mg/L												
Molybdenum	mg/L												
Potassium	mg/L												
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	µg/L												
Atrazine	µg/L												
2,4-D	µg/L												

\*=Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/1/97

Run #: 86

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	5	7	<5.0	60	6			61			<5.0	46	
Total Solids	mg/L	740	760	750	850	770			1300			750	830	
Total Organic Carbon	mg/L	36		33								33		
pH	Standard													
Temperature	Degrees C											*27.2		
Dissolved Oxygen	mg/L													
Color	cu	175		150								150		
Alkalinity	mg/L	310		290								280		
Conductivity	umhos/cm	1200		1200								1200		
Turbidity	NTU	1.5	4.4	0.28	29	2.5			150			0.22	16	
Total Dissolved Solids (TDS)	mg/L	730		700								670		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.03	0.023	0.0054	0.1	0.015						0.0055	0.074	
Total Dissolved Phosphorus	mg/L	0.0078	0.008	<0.0040	0.024	<0.0040						<0.0040	0.018	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080						<0.0080	<0.0080	
TKN	mg/L	2.9		2.7	4.5	3						2.6	3.9	
Ammonia	mg/L	1.1	1.1	1.1	0.93	0.89						0.89	0.96	
Nitrate-Nitrite	mg/L	<0.050		<0.050	<0.050	<0.050						<0.050	<0.050	
<b>ANIONS</b>														
Sulfate	mg/L	51		45	65	56						50	62	
Chloride	mg/L	210		230	260	240						230	250	
<b>CATIONS</b>														
Reactive Silica	mg/L	23		23	23	24						21	23	
Sodium	mg/L	140		130	140	140						130	150	
Zinc	mg/L	<0.020		<0.020	0.046	<0.020						<0.020	0.025	
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20						<0.20	<0.20	
Calcium	mg/L	77		72	74	73						71	78	
Copper	mg/L	<0.025		<0.025	<0.025	<0.025						<0.025	<0.025	
Iron	mg/L	<0.050		0.27	18	0.82						<0.050	12	
Magnesium	mg/L	24		22	22	23						22	26	
Manganese	mg/L	<0.010		0.034	0.019	<0.010						0.015	0.031	
Mercury	mg/L	<0.0002		<0.0002	<0.0002	<0.0002						<0.0002	<0.0002	
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010						<0.010	<0.010	
Potassium	mg/L	8.9		8.4	8.7	8.6						8.2	9.1	
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L	<2.0		<2.0								<2.0		
Atrazine	ug/L	<2.0		<2.0								<2.0		
2,4-D	ug/L	<0.50		<0.50								<0.50		

\* = Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/2/97

Run #: 87

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L												
Total Solids	mg/L												
Total Organic Carbon	mg/L	35		32							34		
pH	Standard												
Temperature	Degrees C										*27.2		
Dissolved Oxygen	mg/L												
Color	cu												
Alkalinity	mg/L												
Conductivity	µmhos/cm												
Turbidity	NTU												
Total Dissolved Solids (TDS)	mg/L												
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.014	0.019	<0.0040							<0.0040		
Total Dissolved Phosphorus	mg/L	0.0089	0.0056	<0.0040							<0.0040		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080		
TKN	mg/L												
Ammonia	mg/L												
Nitrate-Nitrite	mg/L												
<b>ANIONS</b>													
Sulfate	mg/L												
Chloride	mg/L												
<b>CATIONS</b>													
Reactive Silica	mg/L												
Sodium	mg/L												
Zinc	mg/L												
Aluminum	mg/L												
Calcium	mg/L												
Copper	mg/L												
Iron	mg/L												
Magnesium	mg/L												
Manganese	mg/L												
Mercury	mg/L												
Molybdenum	mg/L												
Potassium	mg/L												
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	µg/L												
Atrazine	µg/L												
2,4-D	µg/L												

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/3/97 Run #: 88 Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Pta
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	7	54	<5.0	54	7					28	22		680
Total Solids	mg/L	800	830	810	910	800					800	850		1500
Total Organic Carbon	mg/L	38		34							34			
pH	Standard													
Temperature	Degrees C										*27.8			
Dissolved Oxygen	mg/L													
Color	cp	175		150							175			
Alkalinity	mg/L	340		320							290			
Conductivity	umhos/cm													
Turbidity	NTU	4.7		0.22							0.28			
Total Dissolved Solids (TDS)	mg/L	810		830							780			
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.024	0.043	<0.0040	0.14	0.019					<0.0040	0.046		
Total Dissolved Phosphorus	mg/L	0.0093	0.013	<0.0040	0.029	0.0087					<0.0040	0.005		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080					<0.0080	<0.0080		
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20					<0.20	<0.20		
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L	<0.050		0.13	43	2.8					<0.050	7.4		
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L													
Atrazine	ug/L													
2,4-D	ug/L													

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/7/97

Run #: 89

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Pta	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L														<5
Total Solids	mg/L														<5.0
Total Organic Carbon	mg/L	46		46							48				50
pH	Standard														
Temperature	Degrees C										*28.3				
Dissolved Oxygen	mg/L														
Color	cu														<5.0
Alkalinity	mg/L														<1.0
Conductivity	µmhos/cm														1.8
Turbidity	NTU														<0.10
Total Dissolved Solids (TDS)	mg/L														<5.0
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.052		<0.0040							<0.0040				<0.0040
Total Dissolved Phosphorus	mg/L														<0.004
Soluble Reactive Phosphorus	mg/L														<0.0080
TKN	mg/L														<0.20
Ammonia	mg/L														<0.030
Nitrate-Nitrite	mg/L														<0.050
<b>ANIONS</b>															
Sulfate	mg/L														<5.0
Chloride	mg/L														<1.0
<b>CATIONS</b>															
Reactive Silica	mg/L														<2.0
Sodium	mg/L														<0.50
Zinc	mg/L														<0.020
Aluminum	mg/L														<0.20
Calcium	mg/L														<0.50
Copper	mg/L														<0.025
Iron	mg/L														<0.050
Magnesium	mg/L														<0.50
Manganese	mg/L														<0.010
Mercury	mg/L														<0.00020
Molybdenum	mg/L														<0.010
Potassium	µg/L														<1.0
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	µg/L														
Atrazine	µg/L														
2,4-D	µg/L														

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/8/97

Run #: 90

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	9.5	27	<5.0	76	15		14000	1400			<5.0	40	15000
Total Solids	mg/L	830	820	830	950	890		13000	2200			820	920	15000
Total Organic Carbon	mg/L	48		40								41		
pH	Standard													
Temperature	Degrees C											*27.8		
Dissolved Oxygen	mg/L													
Color	cu	250		200								200		
Alkalinity	mg/L	290		280								260		
Conductivity	umhos/cm	1200		1300								1300		
Turbidity	NTU	4.82	11.4	<0.10	34.5	4.59		3500	320			<0.10	12.9	3200
Total Dissolved Solids (TDS)	mg/L	660		840								740		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.098	0.067	0.01	0.17	0.056		15				0.014	0.1	13
Total Dissolved Phosphorus	mg/L	0.022	0.029	0.011	0.066	0.017		16				0.0093	0.022	13
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.040				<0.0080	<0.0080	<0.016
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L	91		86	72	71		<130				78	80	<130
Chloride	mg/L	200		230	240	220		250				250	240	240
<b>CATIONS</b>														
Reactive Silica	mg/L	24		24	23	24		18				23	22	16
Sodium	mg/L	120		140	140	150		150				140	140	150
Zinc	mg/L	<0.020		<0.020	0.026	<0.020		0.47				<0.020	<0.020	0.58
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		2.6				<0.20	<0.20	2.2
Calcium	mg/L	86		86	79	82		570				85	84	630
Copper	mg/L	<0.025		<0.025	<0.025	<0.025		0.4				<0.025	<0.025	0.26
Iron	mg/L	0.074		0.12	29	2.1		3500				0.073	9.7	3200
Magnesium	mg/L	26		26	24	26		57				26	27	60
Manganese	mg/L	0.016		0.059	0.044	0.012		1.9				0.02	0.035	13
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		<0.00020				<0.00020	<0.00020	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.038				<0.010	<0.010	0.035
Potassium	mg/L	8.6		8.4	9.1	10		13				9.4	10	12
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	ug/L													
Atrazine	ug/L													
2,4-D	ug/L													

\* = Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/9/97

Run #: 91

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L												
Total Solids	mg/L												
Total Organic Carbon	mg/L	55		48							46		
pH	Standard												
Temperature	Degrees C										*28.3		
Dissolved Oxygen	mg/L												
Color	cu												
Alkalinity	mg/L												
Conductivity	µmhos/cm												
Turbidity	NTU												
Total Dissolved Solids (TDS)	mg/L												
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.071	0.05	0.0078							0.012		
Total Dissolved Phosphorus	mg/L	0.028	0.033	0.012							0.012		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080		
TKN	mg/L												
Ammonia	mg/L												
Nitrate-Nitrite	mg/L												
<b>ANIONS</b>													
Sulfate	mg/L												
Chloride	mg/L												
<b>CATIONS</b>													
Reactive Silica	mg/L												
Sodium	mg/L												
Zinc	mg/L												
Aluminum	mg/L												
Calcium	mg/L												
Copper	mg/L												
Iron	mg/L												
Magnesium	mg/L												
Manganese	mg/L												
Mercury	mg/L												
Molybdenum	mg/L												
Potassium	mg/L												
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	µg/L												
Atrazine	µg/L												
2,4-D	µg/L												

\*=Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/10/97

Run #: 92

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	14	<5.0	100	17		18000	1200			<5.0	17	16000
Total Solids	mg/L	860	920	860	1000	140		17000	2200			850	890	15000
Total Organic Carbon	mg/L	52		46								44		
pH	Standard													
Temperature	Degrees C											*27.8		
Dissolved Oxygen	mg/L													
Color	cu	200		150								175		
Alkalinity	mg/L	340		320								300		
Conductivity	µmhos/cm													
Turbidity	NTU	4.5	9.5	<0.10	51	7.3		4700	360			<0.10	5.6	3400
Total Dissolved Solids (TDS)	mg/L	810		810								800		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.081	0.081	0.0054	0.34	0.068		21				0.0079	0.087	13
Total Dissolved Phosphorus	mg/L	0.042	0.045	0.012	0.101	0.034		20				0.014	0.023	14
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	0.013		<0.040				<0.0080	<0.0080	<0.040
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	0.22		<0.20	0.2	<0.20		6.8				<0.20	<0.20	3.4
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L	0.54		0.18	48	4.6		5300				<0.050	2.1	3700
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Note: Stock soln = 220,000 mg/L Fe

\*=Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/11/97 Run #: 93 Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	9	7	27	14		18000	1600			<5.0	24	16000
Total Solids	mg/L	920	950	940	990	900		17000	2600			930	940	15000
Total Organic Carbon	mg/L	42		36								41		
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu	300		200								200		
Alkalinity	mg/L	360		330								310		
Conductivity	µmhos/cm													
Turbidity	NTU	5.4	13	<0.10	14	11		4700	460			<0.10	9.1	3500
Total Dissolved Solids (TDS)	mg/L	820		850								850		
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.048	0.084	0.0084	0.21	0.052		25				0.014	0.11	15
Total Dissolved Phosphorus	mg/L	0.072	0.061	0.013	0.073	0.024		24				0.015	0.025	15
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.011	<0.008		<0.040				<0.0080	<0.0080	<0.040
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L	<0.20		<0.20	<0.20			7600				<0.20	<0.20	3100
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L	0.08		0.48	10	5.2		4000				<0.050	5.9	3200
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/14/97

Run #: 94

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Bleed	Bleed
		Influent	Influent	Micro-filtered		4	5	Solids	Cleaning	Cleaning	Permeate	Tank	Tank
				Effluent					Backwash	Solution		4	5
<b>CONVENTIONAL PARAMETERS</b>													
Total Suspended Solids (TSS)	mg/L												
Total Solids	mg/L												
Total Organic Carbon	mg/L	36		31							35		
pH	Standard												
Temperature	Degrees C										*26.7		
Dissolved Oxygen	mg/L												
Color	cu												
Alkalinity	mg/L												
Conductivity	µmhos/cm												
Turbidity	NTU												
Total Dissolved Solids (TDS)	mg/L												
<b>NUTRIENTS</b>													
Total Phosphorus	mg/L	0.019	0.025	0.0071							0.0043		
Total Dissolved Phosphorus	mg/L	0.017	0.016	0.0051							<0.0040		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080		
TKN	mg/L												
Ammonia	mg/L												
Nitrate-Nitrite	mg/L												
<b>ANIONS</b>													
Sulfate	mg/L												
Chloride	mg/L												
<b>CATIONS</b>													
Reactive Silica	mg/L												
Sodium	mg/L												
Zinc	mg/L												
Aluminum	mg/L												
Calcium	mg/L												
Copper	mg/L												
Iron	mg/L												
Magnesium	mg/L												
Manganese	mg/L												
Mercury	mg/L												
Molybdenum	mg/L												
Potassium	mg/L												
<b>HERBICIDES &amp; PESTICIDES</b>													
Ametryn	µg/L												
Atrazine	µg/L												
2,4-D	µg/L												

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/15/97		Run #: 95		Savannah Laboratories & Environmental Services, Inc											
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	15	<5.0	<5.0	16		19000	420			7	41	15000	<5.0
Total Solids	mg/L	880	840	850	920	820		20000	1300			830	880	15000	<5.0
Total Organic Carbon	mg/L	38		31								33			<1.0
pH	Standard														
Temperature	Degrees C											*26.6			
Dissolved Oxygen	mg/L														
Color	cu	175		125								125			<5.0
Alkalinity	mg/L	330		320								290			<1.0
Conductivity	umhos/cm	1300		1300								1300			1.6
Turbidity	NTU	5.9	10	<0.10	30	6		5400	16			<0.10	11	3000	<0.10
Total Dissolved Solids (TDS)	mg/L	830		810								820			<5.0
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.024	0.024	<0.0040	0.103	0.021		26				0.0059	0.091	17	<0.0040
Total Dissolved Phosphorus	mg/L	0.014	0.023	0.0074	0.043	0.013		25				0.0058	0.016	17	<0.0040
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.0080				<0.0080	<0.0080	<0.0080	<0.0080
TKN	mg/L	3.2		2.7	4.2	2.9		450				2.2	2.7	200	<0.20
Ammonia	mg/L	0.88	1.1	0.85	0.49	0.93		20				0.66	<0.030	10	<0.030
Nitrate-Nitrite	mg/L	<0.050		<0.050	<0.050	0.059		0.63				0.25	<0.50	<0.050	<0.050
<b>ANIONS</b>															
Sulfate	mg/L	68		53	76	59		200				59	67	110	<5.0
Chloride	mg/L	240		270	260	240		350				280	250	260	<1.0
<b>CATIONS</b>															
Reactive Silica	mg/L	32		32	18	33		23				24	20	22	<2.0
Sodium	mg/L	180		160	150	160		130				150	150	140	<0.50
Zinc	mg/L	<0.020		<0.020	<0.020	0.031		0.59				<0.020	<0.020	0.7	<0.020
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		7.8				<0.20	0.21	3.5	<0.20
Calcium	mg/L	84		80	84	84		800				76	87	720	<0.50
Copper	mg/L	<0.025		<0.025	<0.025	<0.025		0.55				<0.025	<0.025	0.37	<0.025
Iron	mg/L	<0.050		0.21	27	2.8		4900				0.11	17	3700	0.055
Magnesium	mg/L	25		24	24	26		86				25	27	67	<0.50
Manganese	mg/L	<0.010		0.029	0.03	0.013		2.7				0.022	0.052	15	<0.010
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		<0.00020				<0.00020	<0.00020	<0.00020	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.11				<0.010	<0.010	0.064	<0.010
Potassium	mg/L	9.7		9.2	8.9	9.7		13				9	10	11	<1.0
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L	<2.0		<2.0								<2.0			<2.0
Atrazine	ug/L	<2.0		<2.0								<2.0			<2.0
2,4-D	ug/L	<0.50		<0.50								<0.50			<0.50

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/17/97		Run #: 97		Savannah Laboratories & Environmental Services, Inc											
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	11	5	56	14		22000	800			<5.0	18	19000	
Total Solids	mg/L	880	860	870	960	880		22000	1800			860	830	18000	
Total Organic Carbon	mg/L	37		32								34			
pH	Standard														
Temperature	Degrees C											*26.7			
Dissolved Oxygen	mg/L														
Color	cu	175		150								150			
Alkalinity	mg/L	330		320								300			
Conductivity	umhos/cm														
Turbidity	NTU	4.6	11	<0.10	35	4.4		8400	14			<0.10	3.8	5000	
Total Dissolved Solids (TDS)	mg/L	810		880								800			
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.02	0.019	<0.0040	0.11	0.018		31				<0.0040	0.04	22	
Total Dissolved Phosphorus	mg/L	0.012	0.014	0.0055	0.054	0.012		35				0.0082	0.018	23	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.16				<0.0080	<0.0080	<0.16	
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		11				<0.20	<0.20	7.4	
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L	<0.050		0.2	25	2.8		8300				0.065	3.4	5400	
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L														
Atrazine	ug/L														
2,4-D	ug/L														

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/18/97

Run #: 98

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	11	<5.0	48	8		25000	440			<5.0	44	6900	
Total Solids	mg/L	840	910	840	950	870		2400	1300			880	900	14000	
Total Organic Carbon	mg/L	37		34								35			
pH	Standard														
Temperature	Degrees C											*26.7			
Dissolved Oxygen	mg/L														
Color	cu	175		150								125			
Alkalinity	mg/L	330		310								300			
Conductivity	umhos/cm														
Turbidity	NTU	8.4	14	<0.10	27	3.5		8500	14			<0.10	12	4500	
Total Dissolved Solids (TDS)	mg/L	830		830								840			
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.022	0.021	<0.0040	0.096	0.015		30				<0.0040	0.04	21	
Total Dissolved Phosphorus	mg/L	0.011	0.013	<0.0040	0.043	0.0094		42				<0.0040	0.01	22	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.16				<0.0080	<0.0080	<0.16	
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		8.9				<0.20	<0.20	5.2	
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L	<0.050		0.42	16	1.9		6200				<0.050	11	4800	
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L														
Atrazine	ug/L														
2,4-D	ug/L														

\* = Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/22/97		Run #: 100		Savannah Laboratories & Environmental Services, Inc											
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	9	9	<5.0	37	<5.0		26000	160			<5.0	29	18000	<5.0
Total Solids	mg/L	830	880	850	870	870		26000	1000			820	900	18000	<5.0
Total Organic Carbon	mg/L	36		32								37			<1.0
pH	Standard														
Temperature	Degrees C											*26.3			
Dissolved Oxygen	mg/L														
Color	cu	150		150								100			<5.0
Alkalinity	mg/L	350		330								310			<1.0
Conductivity	umhos/cm	1300		1300								1300			1.6
Turbidity	NTU	6.5	14	1.4	18	1.6		10000	130			0.29	11	4900	<0.10
Total Dissolved Solids (TDS)	mg/L	840		850								810			<5.0
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.021	0.025	0.0055	0.22	0.031		34				0.0077	0.069	22	<0.0040
Total Dissolved Phosphorus	mg/L	0.021	0.026	0.0068	0.068	0.01		31				0.013	0.037	22	<0.0040
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		0.03				<0.0080	<0.0080	0.047	<0.0080
TKN	mg/L														
Ammonia	mg/L														<0.030
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L	66		51	96	48		<25				64	80	94	<5.0
Chloride	mg/L	50		53	260	250		93				54	260	68	<1.0
<b>CATIONS</b>															
Reactive Silica	mg/L	17		17	33	22		19				13	24	29	<2.0
Sodium	mg/L	150		150	160	160		160				150	170	150	<0.50
Zinc	mg/L	<0.020		<0.020	<0.020	<0.020		0.9				<0.020	<0.020	0.82	0.023
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		7.6				<0.20	<0.20	5	<0.20
Calcium	mg/L	75		76	80	79		1200				80	86	910	<0.50
Copper	mg/L	<0.025		<0.025	<0.025	<0.025		0.79				<0.025	<0.025	0.47	<0.025
Iron	mg/L	<0.050		0.67	9.3	0.4		6400				<0.050	6.3	4800	<0.050
Magnesium	mg/L	24		24	25	26		100				26	28	90	<0.50
Manganese	mg/L	<0.010		0.033	0.01	<0.010		3.5				0.023	0.036	20	<0.010
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		<0.00040				<0.00020	<0.00020	0.00024	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.12				<0.010	<0.010	0.093	<0.010
Potassium	mg/L	8.9		9.3	9.5	9.7		17				9.7	10	13	<1.0
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L														<2.0
Atrazine	ug/L														<2.0
2,4-D	ug/L														<0.50

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/23 /97

Run #: 101

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L	34		32							33			
pH	Standard													
Temperature	Degrees C										*27.1			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.02	0.024	0.01							0.0061			
Total Dissolved Phosphorus	mg/L	0.017	0.015	0.0086							0.0055			
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\*=Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/24/97		Run #: 102		Savannah Laboratories & Environmental Services, Inc											
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	11	9	6	85	19		11000	1000			6	35	7500	
Total Solids	mg/L	940	920	1000	1000	910		27000	1700			920	920	18000	
Total Organic Carbon	mg/L	36		32								33			
pH	Standard														
Temperature	Degrees C											*26.67			
Dissolved Oxygen	mg/L														
Color	cu	180		150								150			
Alkalinity	mg/L	350		340								340			
Conductivity	umhos/cm														
Turbidity	NTU	5.2	9.2	<0.10	5.7	5.8		10000	230			0.1	10	4900	
Total Dissolved Solids (TDS)	mg/L	950		970								920			
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.017	0.027	0.0055	0.12	0.023		29				<0.0040	0.051	19	
Total Dissolved Phosphorus	mg/L	0.0091	0.014	<0.0040	0.062	0.01		29				0.0074	0.013	19	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.160				<0.0080	<0.0080	<0.160	
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		11				<0.20	<0.20	4.8	
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L	0.06		0.58	34	3.1		6800				0.32	11	5100	
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L														
Atrazine	ug/L														
2,4-D	ug/L														

\* = Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/25/97		Run #: 103		Savannah Laboratories & Environmental Services, Inc											
Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	7	13	5	78	15		20000	130			5	17	19000	
Total Solids	mg/L	860	890	840	1000	920		20000	1600			840	960	20000	
Total Organic Carbon	mg/L	36		32								34			
pH	Standard														
Temperature	Degrees C											*27.7			
Dissolved Oxygen	mg/L														
Color	cu	175		150								150			
Alkalinity	mg/L	340		320								300			
Conductivity	umhos/cm														
Turbidity	NTU	5.7	9.2	0.12	43	5.8		6900	190			0.11	10	5100	
Total Dissolved Solids (TDS)	mg/L	880		880								830			
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.026	0.027	0.0042	0.14	0.026		32				0.0084	0.038	20	
Total Dissolved Phosphorus	mg/L	0.014	0.017	0.0063	0.04	0.0095		32				0.0087	0.017	20	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.16				<0.0080	<0.0080	<0.16	
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L	<0.20		<0.20	<0.20	<0.20		9.2				<0.20	<0.20	4	
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L	<0.050		0.2	34	3.1		4900				0.2	8.5	4900	
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L														
Atrazine	ug/L														
2,4-D	ug/L														

\* = Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/28/97

Run #: 104

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) B - 44	B - Elim. 44	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L				320	25								
Total Solids	mg/L				1300	970								
Total Organic Carbon	mg/L	54		47							52			
pH	Standard													
Temperature	Degrees C										*28.3			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU				120	8.9								
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.073	0.094	0.0073	0.87	0.073					<0.0040			
Total Dissolved Phosphorus	mg/L	0.051	0.052	0.0064	1.5	0.039					0.0063			
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080					<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L				120	100								
Chloride	mg/L				210	220								
<b>CATIONS</b>														
Reactive Silica	mg/L				10	21								
Sodium	mg/L				120	130								
Zinc	mg/L				0.078	0.044								
Aluminum	mg/L				0.34	<0.20								
Calcium	mg/L				130	100								
Copper	mg/L				<0.025	<0.025								
Iron	mg/L				80	4								
Magnesium	mg/L				30	27								
Manganese	mg/L				0.11	0.035								
Mercury	mg/L				<0.00020	<0.00020								
Molybdenum	mg/L				<0.010	<0.010								
Potassium	mg/L				10	9.9								
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/30/97

Run #: 105

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash 44	Elim. 44	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	5	19	<5.0	240	31			600			<5.0	570		<5.0
Total Solids	mg/L	960	1000	970	1200	980			1500			980	1500		<5.0
Total Organic Carbon	mg/L	56		50								54			<1.0
pH	Standard														
Temperature	Degrees C														
Dissolved Oxygen	mg/L														
Color	cu	400		250								300			<5.0
Alkalinity	mg/L	1		340								320			<1.0
Conductivity	umhos/cm	1400		1400								1400			1.6
Turbidity	NTU	3.3	7.3	<0.10	58	10			160			2.8	150		<0.10
Total Dissolved Solids (TDS)	mg/L	910		940								870			<5.0
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.091	0.078	0.0076	0.61	0.087						0.016	1		<0.0040
Total Dissolved Phosphorus	mg/L	0.054	0.052	0.013	0.13	0.015						0.022	0.045		0.0056
Soluble Reactive Phosphorus	mg/L	0.02	<0.0080	<0.0080	0.018	<0.0080						<0.0080	0.02		<0.0080
TKN	mg/L	4		3.5	7.2	3.7						3.3	8.4		<0.20
Ammonia	mg/L	0.7	0.7	0.56	0.3	<0.060						0.36	0.29		0.033
Nitrate-Nitrite	mg/L	0.7		0.74	0.81	0.83						0.9	1.1		<0.050
<b>ANIONS</b>															
Sulfate	mg/L	130		160	180	130						170	170		<5.0
Chloride	mg/L	220		220	240	250						220	220		<1.0
<b>CATIONS</b>															
Reactive Silica	mg/L	24		22	12	20						18	12		<2.0
Sodium	mg/L	110		110	120	140						130	110		<0.50
Zinc	mg/L	<0.020		<0.020	0.04	0.034						<0.020	0.092	0.092	<0.020
Aluminum	mg/L	<0.20		0.34	24	0.57						0.93	61		<0.20
Calcium	mg/L	110		110	130	120						120	150		<0.50
Copper	mg/L	<0.025		<0.025	<0.025	<0.025						<0.025	<0.025		<0.025
Iron	mg/L	0.11		<0.050	1.3	2.6						<0.050	12		<0.050
Magnesium	mg/L	28		29	32	32						31	32		<0.50
Manganese	mg/L	0.016		0.014	0.052	0.04						<0.010	0.3		<0.010
Mercury	mg/L	<0.0002		<0.0002	<0.0002	<0.0002						<0.00020	<0.0002		<0.00020
Molybdenum	mg/L	<0.01		<0.01	<0.01	<0.01						<0.010	<0.01		<0.010
Potassium	mg/L	8.7		9	9.7	10						10	10		<1.0
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L														
Atrazine	ug/L														
2,4-D	ug/L														

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 7/31/97

Run #: 106

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash 44	Elim. 44	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	6	18	<5.0	260	44			960			6	210		
Total Solids	mg/L	960	980	940	1100	970			1800			900	1100		
Total Organic Carbon	mg/L	62		55								61			
pH	Standard														
Temperature	Degrees C											*28.89			
Dissolved Oxygen	mg/L														
Color	cu	450		350								400			
Alkalinity	mg/L	360		340								310			
Conductivity	µmhos/cm														
Turbidity	NTU	2.8	5.4	<0.10	51	13			230			3.6	49		
Total Dissolved Solids (TDS)	mg/L	910		850								850			
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.077	0.066	0.01	0.46	0.09						0.014	0.26		
Total Dissolved Phosphorus	mg/L	0.05	0.046	0.019	0.083	0.015						0.015	0.033		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.028	<0.0080						<0.0080	<0.0080		
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L	<0.20		0.4	23	1.1						0.89	20		
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L	0.094		<0.050	1	1.7						<0.050	2.7		
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	µg/L														
Atrazine	µg/L														
2,4-D	µg/L														

\*=Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/1/97

Run #: 107

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash 44	Elim. 44	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	17	<5.0	5	74			560			5	420		
Total Solids	mg/L	960	1000	970	1200	920			1500			980	1400		
Total Organic Carbon	mg/L	62		58								61			
pH	Standard														
Temperature	Degrees C											*28.9			
Dissolved Oxygen	mg/L														
Color	cu	500		400								350			
Alkalinity	mg/L	370		360								330			
Conductivity	µmhos/cm														
Turbidity	NTU	3.1	5.8	<0.10	40	32			140			2	100		
Total Dissolved Solids (TDS)	mg/L	910		850								840			
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.079	0.072	0.013	0.48	0.082						0.016	0.58		
Total Dissolved Phosphorus	mg/L	0.054	0.051	0.022	0.089	0.014						0.022	0.031		
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	0.019	<0.0080						<0.0080	<0.0080		
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L	<0.20		0.41	19	0.89						0.85	43		
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L	0.12		0.06	1	1.3						<0.050	5.9		
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	µg/L														
Atrazine	µg/L														
2,4-D	µg/L														

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/4/97

Run #: 108

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Bleed	Bleed	Bottle
		Influent	Influent	Micro-filtered		4	5	Solids	Cleaning	Cleaning	Permeate	Tank	Tank	Blank
				Effluent					Backwash	Solution		4	5	
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L	46		43							48			
pH	Standard													
Temperature	Degrees C										*27.8			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.092	0.037	0.0065					8.9		0.017			
Total Dissolved Phosphorus	mg/L	0.043	0.041	0.018					6.4		0.017			
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080					<0.040		<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\*=Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/5/97

Run #: 109

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	6	<5.0	<5.0	44	26		14000	320			<5.0	31	15000	<5.0
Total Solids	mg/L	890	890	890	990	860		15000	1200			900	910	16000	<5.0
Total Organic Carbon	mg/L	38		34								37			<1.0
pH	Standard														
Temperature	Degrees C											*26.7			
Dissolved Oxygen	mg/L														
Color	cu	175		150								175			<5.0
Alkalinity	mg/L	330		330								330			<1.0
Conductivity	umhos/cm	1400		1400								1400			1.4
Turbidity	NTU	11	8.6	0.23	46	9.1		3200	120			0.65	7.2	3800	<0.10
Total Dissolved Solids (TDS)	mg/L	900		880								820			<5.0
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.14	0.03	0.018	0.13	0.044		27				0.013	0.077	21	<0.0040
Total Dissolved Phosphorus	mg/L	0.029	0.029	0.012	0.071	0.011		10				0.012	0.024	20	<.004
Soluble Reactive Phosphorus	mg/L	<0.008	<0.008	<0.008	<0.008	<0.008		<0.04				<0.008	<0.008	<0.04	<.008
TKN	mg/L	3.3		3.1	4.5	3.2		180				2.3	3.6	120	<0.20
Ammonia	mg/L	1	1.2	1.2	0.99	0.27		7.9				0.32	0.14	4.6	<0.030
Nitrate-Nitrite	mg/L	<0.05		<0.05	<0.050	0.69		0.18				0.8	0.9	0.51	<0.050
<b>ANIONS</b>															
Sulfate	mg/L	56		70	110	77		130				81	140	140	<5.0
Chloride	mg/L	280		280	290	250		400				270	250	280	<1.0
<b>CATIONS</b>															
Reactive Silica	mg/L	14		16	14	6		9				15	7.1	<10	<2.0
Sodium	mg/L	160		150	160	130		150				160	130	150	<0.50
Zinc	mg/L	<0.020		<0.020	<0.020	<0.020		0.35				<0.020	<0.020	0.42	<0.020
Aluminum	mg/L	<0.20		0.27	7.6	0.46		1400				0.85	3.1	1600	<0.20
Calcium	mg/L	79		79	78	79		740				81	100	1000	<0.50
Copper	mg/L	<0.025		<0.025	<0.025	<0.025		0.16				<0.025	<0.025	0.093	<0.025
Iron	mg/L	<0.050		<0.050	0.086	0.17		64				<0.050	0.13	120	<0.050
Magnesium	mg/L	25		24	24	26		78				26	28	110	<0.50
Manganese	mg/L	<0.010		<0.010	<0.010	<0.010		1.7				<0.010	<0.010	4.7	<0.010
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		0.00036				<0.00020	<0.00020	0.00024	<0.00050
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.016				<0.010	<0.010	<0.010	<0.010
Potassium	mg/L	9.3		8.7	9.2	9.2		14				9.8	9.4	25	<1.0
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L	<2.0		<2.0								<2.0			<2.0
Atrazine	ug/L	<2.0		<2.0								<2.0			<2.0
2,4-D	ug/L	<0.50		<0.50								<0.50			<0.50

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/6/97

Run #: 110

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L	37		25							38			
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.031	0.045	0.02							0.009			
Total Dissolved Phosphorus	mg/L	0.039	0.052	0.017							0.021			
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/7/97 Run #: 111 Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	19	<5.0	250	34		16000	1200			<5.0	15	9600	
Total Solids	mg/L	860	890	830	1100	870		16000	1700			850	900	9800	
Total Organic Carbon	mg/L	42		32								36			
pH	Standard														
Temperature	Degrees C											*27.2			
Dissolved Oxygen	mg/L														
Color	cu	225		125								150			
Alkalinity	mg/L	340		320								280			
Conductivity	µmhos/cm														
Turbidity	NTU	6.3	12	0.2	100	6.3		3600	210			1.6	4.3	2100	
Total Dissolved Solids (TDS)	mg/L	850		830								900			
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.053	0.064	0.0062	0.4	0.04		17				0.01	0.057	10	
Total Dissolved Phosphorus	mg/L	0.038	0.034	0.0065	0.12	0.011		18				0.0065	0.022	10	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.040				<0.0080	<0.0080	<0.040	
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L	<0.20		0.25	49	1.4		1300				0.85	1.1	910	
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L	<0.050		<0.050	0.4	0.095		69				<0.050	0.077	100	
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	µg/L														
Atrazine	µg/L														
2,4-D	µg/L														

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/8/97

Run #: 112

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash 44	Elim. 44	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	14	<5.0	380	32			700			8	40	11000	
Total Solids	mg/L	890	870	880	1200	870			1500			900	920	12000	
Total Organic Carbon	mg/L	40		39								46			
pH	Standard														
Temperature	Degrees C											*27.3			
Dissolved Oxygen	mg/L														
Color	cu	225		150								200			
Alkalinity	mg/L	360		330								310			
Conductivity	µmhos/cm														
Turbidity	NTU	7.4	13	0.14	130	13			150			2.7	6.9	2400	
Total Dissolved Solids (TDS)	mg/L	890		880								860			
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.084	0.094	0.0093	1.3	0.071						0.018	0.095	12	
Total Dissolved Phosphorus	mg/L	0.068	0.058	0.012	0.29	0.028		13				0.017	0.028	13	
Soluble Reactive Phosphorus	mg/L	0.049	0.024	<0.0080	0.12	<0.0080						<0.0080	<0.0080	<0.04	
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L	<0.20		0.24	68	1.4						1	5.4	1200	
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L	0.077		<0.050	1.1	0.37						<0.050	0.19	89	
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	µg/L														
Atrazine	µg/L														
2,4-D	µg/L														

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/11/97

Run #: 113

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L	42		33							38			
pH	Standard													
Temperature	Degrees C										*26.67			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.057	0.032	<0.0040							<0.0040			
Total Dissolved Phosphorus	mg/L	0.037	0.035	0.0064							0.016			
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/12/97

Run #: 114

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	25	<5.0	750	29		20000	1200			7	13	20000	<5.0
Total Solids	mg/L	940	950	940	1600	930		21000	1800			920	920	20000	<5.0
Total Organic Carbon	mg/L	42		36								38			
pH	Standard														
Temperature	Degrees C											*26.7			
Dissolved Oxygen	mg/L														
Color	cu	250		150								200			<5
Alkalinity	mg/L	360		330								310			<1.0
Conductivity	umhos/cm	1300		1100								1300			2.2
Turbidity	NTU	4.2	9.3	0.38	140	4.6		4700	280			1.5	5.6	4000	<0.10
Total Dissolved Solids (TDS)	mg/L	850		880								870			<5.0
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.052	0.057	0.0059	0.74	0.053		36				0.0086	0.046	21	<0.0040
Total Dissolved Phosphorus	mg/L	0.034	0.035	0.0075	0.078	0.012		39				<0.0040	0.0085	21	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.0080				<0.0080	<0.0080	<0.0080	
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L	76		120	140	100		75				150	160	87	<5.0
Chloride	mg/L	270		270	260	260		580				260	250	240	<1.0
<b>CATIONS</b>															
Reactive Silica	mg/L	8		14	10	26		69				13	13	13	<2.0
Sodium	mg/L	170		160	150	160		160				150	150	170	<0.50
Zinc	mg/L	<0.020		<0.020	0.029	<0.020		0.61				<0.020	<0.020	0.53	<0.020
Aluminum	mg/L	<0.20		0.27	76	2.5		2400				0.7	2.3	2000	<0.20
Calcium	mg/L	94		90	120	96		1100				94	88	1100	<0.50
Copper	mg/L	<0.025		<0.025	<0.025	<0.025		0.27				<0.025	<0.025	0.15	<0.025
Iron	mg/L	<0.050		<0.050	0.68	0.11		100				<0.050	<0.0050	140	<0.050
Magnesium	mg/L	30		28	30	29		110				28	27	120	<0.50
Manganese	mg/L	<0.010		<0.010	0.025	<0.010		2.6				<0.010	<0.010	4.4	<0.010
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		0.00026				<0.00020	<0.00020	<0.00020	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.04				<0.010	<0.010	0.014	<0.010
Potassium	mg/L	11		10	10	11		16				9.8	9.1	26	<1.0
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L														<2.0
Atrazine	ug/L														<2.0
2,4-D	ug/L														<0.50

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/13/97

Run #: 115

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.068	0.034	0.0077							0.0055			
Total Dissolved Phosphorus	mg/L	0.022	0.02	0.013							0.012			
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/14/97

Run #: 116

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	8	30	<5.0	39	18		23000			6	35	21000	
Total Solids	mg/L	950	950	950	910	880		22000			920	920	20000	
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										*27.3			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L	870		900							850			
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.055	0.044	0.013	0.14	0.047		37			0.0086	0.066	23	
Total Dissolved Phosphorus	mg/L	0.029	0.029	0.017	0.042	0.023		44			0.011	0.019	24	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.0080			<0.0080	<0.0080	0.058	
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\*=Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/15/97

Run #: 117

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	6	30	<5	61	29		23000			5	20	18000	
Total Solids	mg/L	890	930	910	960	900		22000			890	900	17000	
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										*28.3			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L	880		870							850			
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.061	0.049	0.0073	0.11	0.044		23			0.011	0.059	19	
Total Dissolved Phosphorus	mg/L	0.031	0.036	0.012	0.043	0.02		40			0.014	0.018	19	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		0.088			<0.0080	<0.0080	<0.04	
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/18/97

Run #: 118

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Bleed	Bleed	Bottle
		Influent	Influent	Micro-filtered		4	5	Solids	Cleaning	Cleaning	Permeate	Tank	Tank	Blank
				Effluent					Backwash	Solution		4	5	
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										*28			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.051	0.042	0.01							0.0086			
Total Dissolved Phosphorus	mg/L	0.025	0.033	0.011							0.025			
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080							<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/20/97 Run #: 119 Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	8	<5.0	25	8		23000	1600			<5.0	<5.0	23000	<5.0
Total Solids	mg/L	960	960	940	1000	960		24000	2300			920	910	23000	<5.0
Total Organic Carbon	mg/L	42		34								36			<1.0
pH	Standard														
Temperature	Degrees C											*27.8			
Dissolved Oxygen	mg/L														
Color	cu	175		125								125			5
Alkalinity	mg/L	360		360								340			<1.0
Conductivity	umhos/cm	1300		1300								1400			1.8
Turbidity	NTU	8.4	7.4	<0.10	12	3.6		5000	240			<0.10	3.8	4400	<0.10
Total Dissolved Solids (TDS)	mg/L	940		920								900			<5.0
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.072	0.18	0.0054	0.22	0.043		34		2.6		0.0092	0.077	22	<0.0040
Total Dissolved Phosphorus	mg/L	0.037	0.034	0.01	0.13	0.038		33		2.6		0.016	0.028	22	<0.0040
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.0080		<0.020		<0.0080	<0.0080	0.021	<0.0080
TKN	mg/L	3.6		2.8	4.2	2.8		200				2.7	3.1	110	<0.20
Ammonia	mg/L	0.85	0.94	0.93	0.57	0.26		18				0.76	<0.030	17	<0.030
Nitrate-Nitrite	mg/L	<0.050		<0.050	<0.050	0.55		1.2				0.057	0.16	1	<0.050
<b>ANIONS</b>															
Sulfate	mg/L	86		84	110	75		110				90	120	84	<5.0
Chloride	mg/L	280		300	270	260		420				300	250	300	<1.0
<b>CATIONS</b>															
Reactive Silica	mg/L	41		35	28	38		29				23	15	7.8	<2.0
Sodium	mg/L	180		170	160	160		150				160	160	180	<0.50
Zinc	mg/L	<0.020		0.023	0.023	0.037		0.57				<0.020	0.1	0.66	<0.020
Aluminum	mg/L	<0.20		<0.20	3.7	1.1		2400				0.3	1.5	2600	<0.20
Calcium	mg/L	95		88	97	81		1100				85	85	1300	<0.50
Copper	mg/L	<0.025		<0.025	0.025	<0.025		0.25				<0.025	<0.025	0.17	<0.025
Iron	mg/L	<0.050		<0.050	<0.050	<0.050		120				<0.050	<0.050	130	<0.050
Magnesium	mg/L	31		29	31	28		100				28	28	140	<0.50
Manganese	mg/L	0.01		<0.010	0.013	<0.010		2.4				<0.010	<0.010	4.3	<0.010
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		0.00051				<0.00020	<0.00020	0.00022	<0.00020
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.025				<0.010	<0.010	0.026	<0.010
Potassium	mg/L	9		8.7	8.6	8.8		14				8.4	8.8	25	<1.0
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L	<2.0		<2.0								<2.0			
Atrazine	ug/L	<2.0		<2.0								<2.0			
2,4-D	ug/L	<0.50		<0.50								<0.50			

\*=Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/21/97

Run #: 120

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash 44	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	6	8	<5.0	250	8					<5.0	19	15000	
Total Solids	mg/L	960	960	930	1400	910		930			930	910	14000	
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										*28.9			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L	940		920							880			
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.058	0.065	0.0098	0.52	0.049					0.013	0.034	13	
Total Dissolved Phosphorus	mg/L	0.055	0.046	0.01	0.12	0.025					0.014	0.02	16	
Soluble Reactive Phosphorus	mg/L	0.022	<0.0080	<0.0080	<0.0080	<0.0080					<0.0080	<0.0080	<0.0080	
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L				82									
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L				0.62									
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/22/97

Run #: 121

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash 44	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0	<5.0	<5.0	400	<5.0					<5.0	35	22000	
Total Solids	mg/L	970	960	960	1300	910					930	910	21000	
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										28.89			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU	4.8		0.32							1.6			
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.083	0.069	0.0091	0.52	0.035					0.012	0.062	21	
Total Dissolved Phosphorus	mg/L	0.056	0.051	0.0087	0.1	0.013					0.016	0.015	21	
Soluble Reactive Phosphorus	mg/L	0.04	0.035	<0.0080	<0.0080	<0.0080					0.017	<0.0080	<0.0080	
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L				77									
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L				0.57									
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/25 /97

Run #: 122

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										27.78			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.1	0.1	0.017							0.013			
Total Dissolved Phosphorus	mg/L	0.08	0.073	0.028							0.037			
Soluble Reactive Phosphorus	mg/L	0.064	0.044	<0.0080							<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/26 /97

Run #: 123

Savannah Laboratories & Environmental Services, Inc

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	Pta	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	<5.0	12	<5.0	400	28		28000	2500			<5.0		20000	<5.0
Total Solids	mg/L	1000	1000	1000	1600	970		25000	3000			990		18000	<5.0
Total Organic Carbon	mg/L	54		45								48			
pH	Standard														
Temperature	Degrees C											27.22			
Dissolved Oxygen	mg/L														
Color	cu	175		175								175			5
Alkalinity	mg/L	400		390								380			<1.0
Conductivity	umhos/cm	1300		1200								1200			2.8
Turbidity	NTU	3.2	4.9	<0.10	96	18		5300	320			0.1		3300	<0.10
Total Dissolved Solids (TDS)	mg/L	970		980								940			<5.0
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.2	0.094	0.016	0.62	0.05		37				0.027	0.12	19	
Total Dissolved Phosphorus	mg/L	0.07	0.069	0.014	0.12	0.031		35				0.013	0.017	19	<0.0040
Soluble Reactive Phosphorus	mg/L	0.055	0.048	0.015	0.013	0.011		<0.080				0.013	0.009	<0.0080	<0.0080
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L	130		150	170	120		76				140		120	<5.0
Chloride	mg/L	200		210	220	210		980				210		400	<1.0
<b>CATIONS</b>															
Reactive Silica	mg/L	45		39	48	47		8.5				30		4.5	<2.0
Sodium	mg/L	140		140	140	140		150				120	140	160	
Zinc	mg/L	0.025		<.02	<.02	<.02		0.68				<.02	<.02	0.48	
Aluminum	mg/L	<.2		<.2	76	0.74		3000				<.2	4.7	2200	
Calcium	mg/L	120		120	130	97		1200				120	99	990	
Copper	mg/L	<0.025		<0.025	<0.025	<0.025		0.25				<0.025	<0.025	0.12	
Iron	mg/L	0.11		0.05	0.78	0.098		86				<.05	0.063	77	
Magnesium	mg/L	36		37	38	35		110				40	34	100	
Manganese	mg/L	0.013		0.014	0.034	0.01		2				<0.010	<0.010	3.1	
Mercury	mg/L	<0.00020		<0.00020	<0.00020	<0.00020		<0.00020				<0.00020	<0.00020	<0.00020	
Molybdenum	mg/L	<0.010		<0.010	<0.010	<0.010		0.03				<0.010	<0.010	0.011	
Potassium	mg/L	8.2		8.4	9.7	9.4		16				9.2	10	20	
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	ug/L														
Atrazine	ug/L														
2,4-D	ug/L														

=Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/27 /97

Run #: 124

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										27.22			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.088	0.0086	0.012							0.013			
Total Dissolved Phosphorus	mg/L	0.069	0.069	0.0089							0.0074			
Soluble Reactive Phosphorus	mg/L	0.037	0.044	<0.0080							<0.0080			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/28/97

Run #: 125

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	7	5	<5.0	97	24		27000			<5.0	48	21000	
Total Solids	mg/L	1000	980	970	1200	960		24000			930	960	22000	
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										27.22			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU	5.1	5.9	<0.10	37	15		4800			<0.10	5.7	4100	
Total Dissolved Solids (TDS)	mg/L	950		930							900			
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.051	0.097	0.02	0.4	0.088		29			0.021	0.11	24	
Total Dissolved Phosphorus	mg/L	0.074	0.063	<0.0040	0.21	0.049		58			0.025	0.03	24	
Soluble Reactive Phosphorus	mg/L	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080		<0.0080			<0.0080	<0.0080	<0.0080	
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/28/97

Run #: 126

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	6	<5	<5	15	14		18000			<5	40	22000	
Total Solids	mg/L	970	980	940	960	990		20000			930	960	20000	
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										27.22			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU	8.4	9.2	0.1	5.5	12		5300			0.12	7.9	4200	
Total Dissolved Solids (TDS)	mg/L	980		910							870			
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.065	0.054	<0.0040	0.078	0.044		33	1.2		<0.0040	0.092	20	
Total Dissolved Phosphorus	mg/L	0.038	0.045	<.004	0.027	0.014		33	1.7		<0.004	0.013	21	
Soluble Reactive Phosphorus	mg/L	0.014	0.009	<.008	<.008	<.008		<.04	<.008		0.016	<.008	0.078	
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/29/97

Run # 126A

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.049		<.004									<0.0040	
Total Dissolved Phosphorus	mg/L													
Soluble Reactive Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/29/97

Run # 126B

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.061		<.004							<0.004			
Total Dissolved Phosphorus	mg/L													
Soluble Reactive Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/29/97

Run # 126C

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.046		<.004							<0.0040			
Total Dissolved Phosphorus	mg/L													
Soluble Reactive Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/29/97

Run # 126D

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	<.004		0.063							<0.0040			
Total Dissolved Phosphorus	mg/L													
Soluble Reactive Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/28/97

Run #126E

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.052		0.032							<0.0040			
Total Dissolved Phosphorus	mg/L													
Soluble Reactive Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/29/97

Run # 126F

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.057		<0.0040							<0.0040			
Total Dissolved Phosphorus	mg/L													
Soluble Reactive Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/29/97

Run # 126G

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.046		<0.0040									<0.0040	
Total Dissolved Phosphorus	mg/L													
Soluble Reactive Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 8/29/97

Run # 126H

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L													
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.037		<0.0040							<0.0040			
Total Dissolved Phosphorus	mg/L													
Soluble Reactive Phosphorus	mg/L													
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

Notes:  
 1. < = Below laboratory method detection limit  
 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/2/97

Run #: 127

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Bleed	Bleed	Bottle	
		Influent	Influent	Micro-filtered		4	5	Solids	Cleaning	Cleaning	Permeate	Tank	Tank	Blank	
				Effluent					Backwash	Solution		4	5		
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L														
Total Solids	mg/L														
Total Organic Carbon	mg/L														
pH	Standard														
Temperature	Degrees C										27.78				
Dissolved Oxygen	mg/L														
Color	cu														
Alkalinity	mg/L														
Conductivity	µmhos/cm														
Turbidity	NTU														
Total Dissolved Solids (TDS)	mg/L														
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.053		<0.0040							<0.0040				
Total Dissolved Phosphorus	mg/L														
Soluble Reactive Phosphorus	mg/L														
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L														
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L														
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	µg/L														
Atrazine	µg/L														
2,4-D	µg/L														

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/4/97

Run #: 128

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	5		<5.0							<5.0			
Total Solids	mg/L													
Total Organic Carbon	mg/L	42		44							41			
pH	Standard													
Temperature	Degrees C										28.33			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.067	0.12	<0.0040							<0.0040			
Total Dissolved Phosphorus	mg/L	0.097	0.1	0.058							0.03			
Soluble Reactive Phosphorus	mg/L	0.1	0.11	0.078							0.041			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers
- Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/5/97

Run #: 129

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Bleed	Bleed	Bottle	
		Influent	Influent	Micro-filtered		4	5	Solids	Cleaning	Cleaning	Permeate	Tank	Tank	Blank	
				Effluent					Backwash	Solution		4	5		
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L	7		<5							<5				
Total Solids	mg/L														
Total Organic Carbon	mg/L														
pH	Standard														
Temperature	Degrees C										27.78				
Dissolved Oxygen	mg/L														
Color	cu														
Alkalinity	mg/L														
Conductivity	µmhos/cm														
Turbidity	NTU														
Total Dissolved Solids (TDS)	mg/L														
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.049		<.004							0.028				<.004
Total Dissolved Phosphorus	mg/L	0.031		0.013							0.024				<.004
Soluble Reactive Phosphorus	mg/L	0.051		0.042							0.033				<.008
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L														
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L														
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	µg/L														
Atrazine	µg/L														
2,4-D	µg/L														

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/8/97

Run #: 130

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0		<5.0							<5.0			
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										26.67			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.094		0.0097							<0.0040			
Total Dissolved Phosphorus	mg/L	0.023		0.011							0.0086			<0.0040
Soluble Reactive Phosphorus	mg/L	0.059		0.042							0.049			0.009
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/9/97

Run #: 131

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0		<5.0							<5.0			
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										27.22			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.34		0.0084							0.031			
Total Dissolved Phosphorus	mg/L	0.022		0.014							0.02			
Soluble Reactive Phosphorus	mg/L	0.022		0.022							0.044			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

1. < = Below laboratory method detection limit
2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers
3. Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/10/97

Run #: 132

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0		<5.0							<5.0			
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C										27.78			
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.077		0.016							0.022			
Total Dissolved Phosphorus	mg/L	0.031		0.019							0.054			
Soluble Reactive Phosphorus	mg/L	0.022		0.018							0.035			
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/11/97

Run #: 133

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened &	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Bleed	Bleed	Bottle
		Influent	Influent	Micro-filtered Effluent		4	5	Solids	Cleaning Backwash	Cleaning Solution	Permeate	Tank 4	Tank 5	Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0		<5.0										
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.072		0.011										
Total Dissolved Phosphorus	mg/L	0.03		0.025										
Soluble Reactive Phosphorus	mg/L	0.054		<0.0080										
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/12/97

Run #: 134

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Bleed	Bleed	Bottle
		Influent	Influent	Micro-filtered		4	5	Solids	Cleaning	Cleaning	Permeate	Tank	Tank	Blank
				Effluent					Backwash	Solution		4	5	
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	<5.0		<5.0										
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.048		0.023										
Total Dissolved Phosphorus	mg/L	0.053		0.056										
Soluble Reactive Phosphorus	mg/L	0.039		0.044										
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: 9/15/97

Run #: 135

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened Influent	2) Screened Influent	3) Screened & Micro-filtered Effluent	4) Backwash	Elim. 4	Elim. 5	5) Precipitated Solids	6) Chemical Cleaning Backwash	7) Membrane Cleaning Solution	8) Zenon Permeate	Bleed Tank 4	Bleed Tank 5	Bottle Blank
<b>CONVENTIONAL PARAMETERS</b>														
Total Suspended Solids (TSS)	mg/L	8		<5.0										
Total Solids	mg/L													
Total Organic Carbon	mg/L													
pH	Standard													
Temperature	Degrees C													
Dissolved Oxygen	mg/L													
Color	cu													
Alkalinity	mg/L													
Conductivity	µmhos/cm													
Turbidity	NTU													
Total Dissolved Solids (TDS)	mg/L													
<b>NUTRIENTS</b>														
Total Phosphorus	mg/L	0.044		0.025										
Total Dissolved Phosphorus	mg/L	0.047		0.061										
Soluble Reactive Phosphorus	mg/L	0.03		0.027										
TKN	mg/L													
Ammonia	mg/L													
Nitrate-Nitrite	mg/L													
<b>ANIONS</b>														
Sulfate	mg/L													
Chloride	mg/L													
<b>CATIONS</b>														
Reactive Silica	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Aluminum	mg/L													
Calcium	mg/L													
Copper	mg/L													
Iron	mg/L													
Magnesium	mg/L													
Manganese	mg/L													
Mercury	mg/L													
Molybdenum	mg/L													
Potassium	mg/L													
<b>HERBICIDES &amp; PESTICIDES</b>														
Ametryn	µg/L													
Atrazine	µg/L													
2,4-D	µg/L													

\* = Avg. Temp.

Notes:

- < = Below laboratory method detection limit
- All data reported on laboratory sheets employed FAC 62-160 required data qualifiers
- Shaded data are statistical outliers and are not used in data calculations

**TABLE 5 DAILY MICROFILTRATION ANALYSIS RESULTS**

Sample Collected: /97

Run #: 136

Savannah Laboratories & Environmental Services, Inc.

Parameter	Units	1) Pre-screened	2) Screened	3) Screened &	4) Backwash	Elim.	Elim.	5) Precipitated	6) Chemical	7) Membrane	8) Zenon	Bleed	Bleed	Bottle	
		Influent	Influent	Micro-filtered		4	5	Solids	Cleaning	Cleaning	Permeate	Tank	Tank	Blank	
				Effluent					Backwash	Solution		4	5		
<b>CONVENTIONAL PARAMETERS</b>															
Total Suspended Solids (TSS)	mg/L														
Total Solids	mg/L														
Total Organic Carbon	mg/L														
pH	Standard														
Temperature	Degrees C														
Dissolved Oxygen	mg/L														
Color	cu														
Alkalinity	mg/L														
Conductivity	µmhos/cm														
Turbidity	NTU														
Total Dissolved Solids (TDS)	mg/L														
<b>NUTRIENTS</b>															
Total Phosphorus	mg/L	0.048		0.023											
Total Dissolved Phosphorus	mg/L														
Soluble Reactive Phosphorus	mg/L														
TKN	mg/L														
Ammonia	mg/L														
Nitrate-Nitrite	mg/L														
<b>ANIONS</b>															
Sulfate	mg/L														
Chloride	mg/L														
<b>CATIONS</b>															
Reactive Silica	mg/L														
Sodium	mg/L														
Zinc	mg/L														
Aluminum	mg/L														
Calcium	mg/L														
Copper	mg/L														
Iron	mg/L														
Magnesium	mg/L														
Manganese	mg/L														
Mercury	mg/L														
Molybdenum	mg/L														
Potassium	mg/L														
<b>HERBICIDES &amp; PESTICIDES</b>															
Ametryn	µg/L														
Atrazine	µg/L														
2,4-D	µg/L														

\* = Avg. Temp.

Notes:

- 1. < = Below laboratory method detection limit
- 2. All data reported on laboratory sheets employed FAC 62-160 required data qualifiers

APPENDIX 2

FDEP QUALITY ASSURANCE  
SECTION APPROVED SITE  
SPECIFIC QUALITY ASSURANCE PLAN

APPENDIX 3

FDEP BIOLOGY SECTION REPORT  
ON BIOASSAY RESULTS FOR THE  
MICROFILTRATION STUDIES